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The American Society of Orthodontists meeting in New York City, Dec. 27 to 29, 1906. (Courtesy of Dr. J. A. Gorman.) The names of the members have been filled in, insofar as the editorial staff had access to identification prior to going to press. Who will help the editor fill in the remainder of the names to make the list complete?

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Original Articles

CORRECTION OF SEVERE MANDIBULAR PROTRUSION BY OSTEOTOMY OF THE RAMI AND ORTHODONTICS

BENJAMIN WEISS, D.D.S., MAXWELL J. LENTZ, D.D.S., AND JULIUS NEWMAN, M.D.
NEWARK, N. J.

THE case report herewith presented shows the need for a close cooperation between the medical and dental professions, and still further between general dentists and dental specialists.

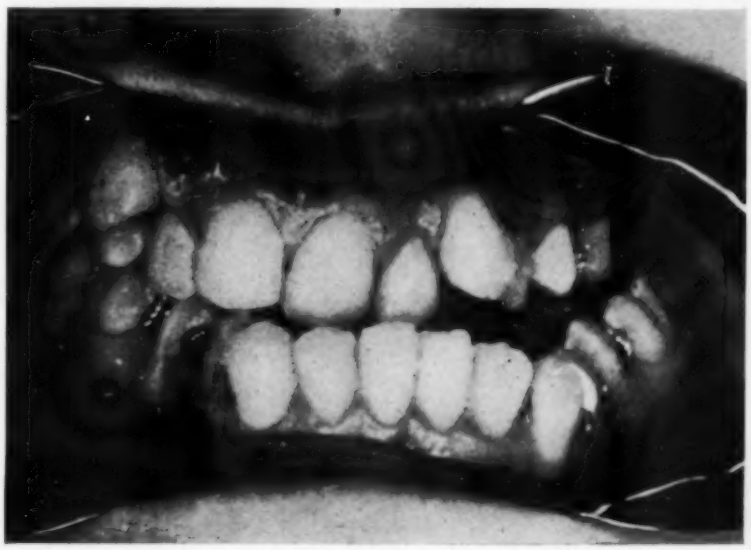

Fig. 1.

This young girl had been told by several dentists and physicians that nothing could be done for her condition. She presented a severe protrusion of the mandible with displacement to one side. The center line was off the distance of at least two mandibular incisors (Fig. 1).

Read before the New York Society of Orthodontists, Nov. 11, 1940.

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When the permanent incisors erupted they assumed a slight Class III relationship, gradually becoming worse. Beginning at age 13 years, probably associated with the onset of puberty, the parents noticed that the mandibular protrusion was increasing, and that the mandible was being thrown to one side.

Her medical history was as follows: The girl, aged 19 years, was the youngest of ten children of Italian parents. Her general health was good, but she appeared depressed because of her appearance. The mother reported a normal pregnancy and delivery. She was breast fed about nine months and had no thumb or other sucking habits. The occlusion of both parents and most of the other children was normal. She had few infant diseases. Tonsils and adenoids showed no pathology. Musculature around the face functioned normally. The tongue was normal in size. The midline of the teeth was correct in the maxilla and off to the left in the mandible.

X-rays of the temporomandibular joints showed the left condyle to be in normal relationship to the glenoid fossa both in centric and with the bite open. It was also normal in size. The right condyle was larger and occupied almost all of the glenoid fossa in centric. With the bite open, the right condyle did not move out of the glenoid fossa. The hypophysis appeared normal in a lateral plate. Lateral plates also showed that the right ramus was much narrower than the left.

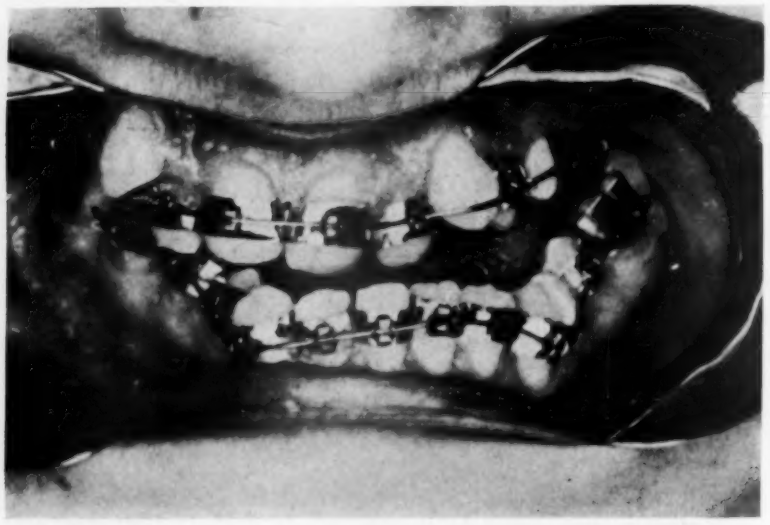

Fig. 2.

Realizing our limitations with orthodontic therapy alone, it was decided to do a subcutaneous resection of both rami, then reposition the mandible as nearly central as possible and immobilize the jaws in their new relationship.

Due to putrescent pulps, the maxillary right first premolar and the mandibular left first premolar were extracted. Since all four third molars were impacted and because the second molars in their new occlusion would cause too much of an open-bite, all four second molars were extracted.

The Angle edgewise arch was the appliance used. All remaining teeth were banded, with the exception of both maxillary canines which were blocked out labially (Fig. 2).

PREOPERATIVE DETERMINATION

Plaster casts of both mandible and maxilla were made and face-bow registrations were taken. Ascending rami with condyles simulating the position of those of the patient were reproduced in low-fusing metal.

Fig. 3.

Fig. 4.

To insure close proximity of the cut sections as well as fair occlusion following correction, several sectionings were done on these models to determine the direction of the cuts. It was found that the best result could be obtained by directing the cut through the ascending rami slightly upward and forward (Fig. 3).

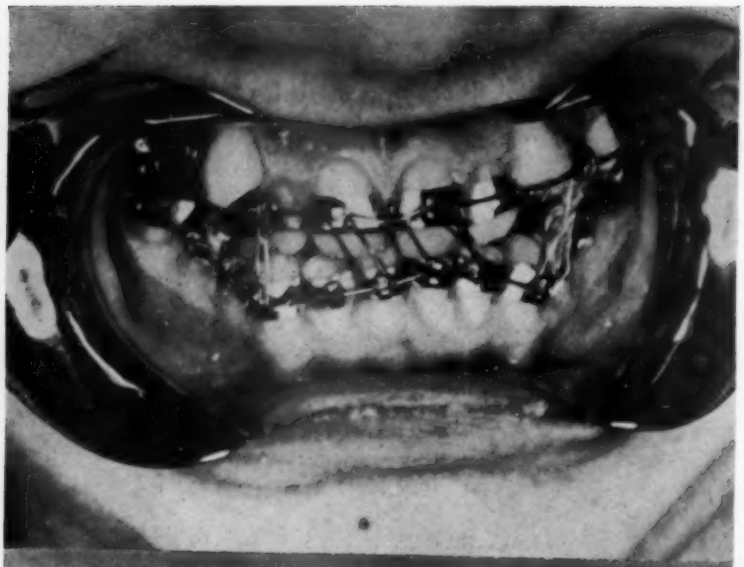

Fig. 5.

Fig. 6.

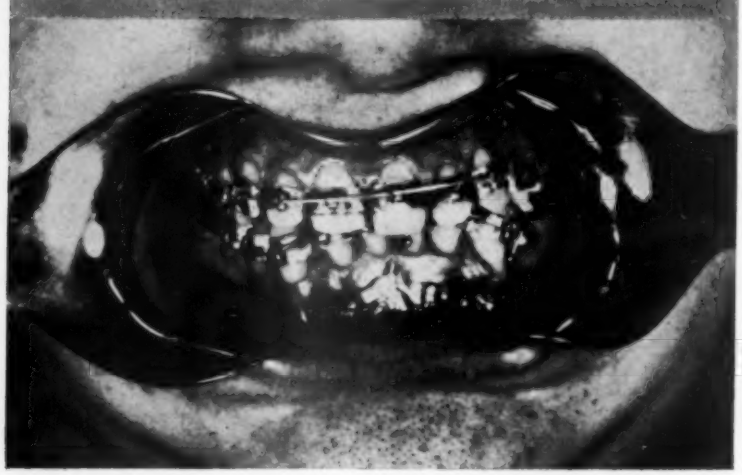

Fig. 7.

OPERATION

The operation consisted of bilateral osteotomy of the ascending rami as described by Blair in the operation for retraction of the mandible. An incision 2 cm. in length was made along the posterior border of the ascending ramus. After dividing the skin, it was drawn forward and the parotid sheath opened at the anterior border of the gland which was then drawn backward until the posterior border of the mandible could be felt. A large blunt curved needle

Fig. 8.—Left profile view, before and after treatment.

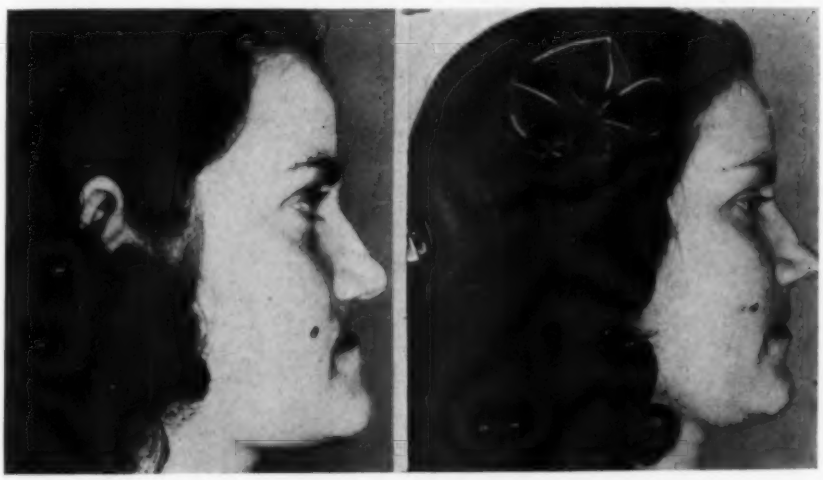

Fig. 9.—Right profile view, before and after treatment.

with handle attached and carrying a heavy black silk ligature was passed between the parotid gland and the masseter muscle to the posterior border of the ramus. With the tip of the needle constantly hugging the bone, it was passed along the inner surface until the tip could be felt anteriorly. After being assured of the correct angle of the cut to be made, the skin was then drawn tight over the tip of the needle and nicked. A Gigli saw was then attached to the

ligature and the needle withdrawn (Fig. 4). Both rami were cut across by means of the Gigli saw as described, and the body of the mandible was placed in its new position and held by means of intermaxillary wiring of the orthodontic appliances.

The mandible was wired to the maxilla with 0.010 stainless steel ligatures and kept thus immobilized for a period of four weeks (Fig. 5). A Barton's bandage was also used for several days. At the end of four weeks, small vertical elastics connecting maxilla and mandible replaced the wires (Fig. 6) and the patient was allowed the slight movement, exercise, and function the elastic stretch would give.

A. *B.* *C.*

Fig. 10.—Full face views, *A*, before; *B* and *C*, after treatment.

For the next several months, orthodontic treatment was continued to bring the blocked out canines into alignment and to create enough overbite to act as a check in preventing the mandible from drifting forward (Fig. 7). No retention was used after the appliances were removed. The results are shown in Figs. 8 to 11.

Appreciation is hereby expressed to Dr. S. E. Riesner of New York for his cooperation and for the diagnosis and radiographs of the temporomandibular joints; and to Dr. Harold A. Lentz for his valued assistance.

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HASBROUCK HEIGHTS, N. J., RECONSTRUCTION HOSPITAL

DISCUSSION

Dr. Maxwell J. Lentz.—When this patient was brought to my attention, it was found that it required not only an oral surgeon, but an orthodontist and also a plastic surgeon. There are certain things that I should like to stress. The operation performed was similar to that for cases of retruded mandible. We attempted to produce the best possible harmonious

relationship of the mandible to the rest of the face, keeping in mind that in addition to the cut sections the teeth should also be brought into apposition in order to get the best dental result.

A very important point in the procedure is the preoperative planning of the case. The necessary radiographs are taken. In this case we had an orthodontist, who is well known for his work in the temporomandibular joint, take the radiographs. Models were made with face bow registrations—incidentally, I have never seen anything in the literature on this—

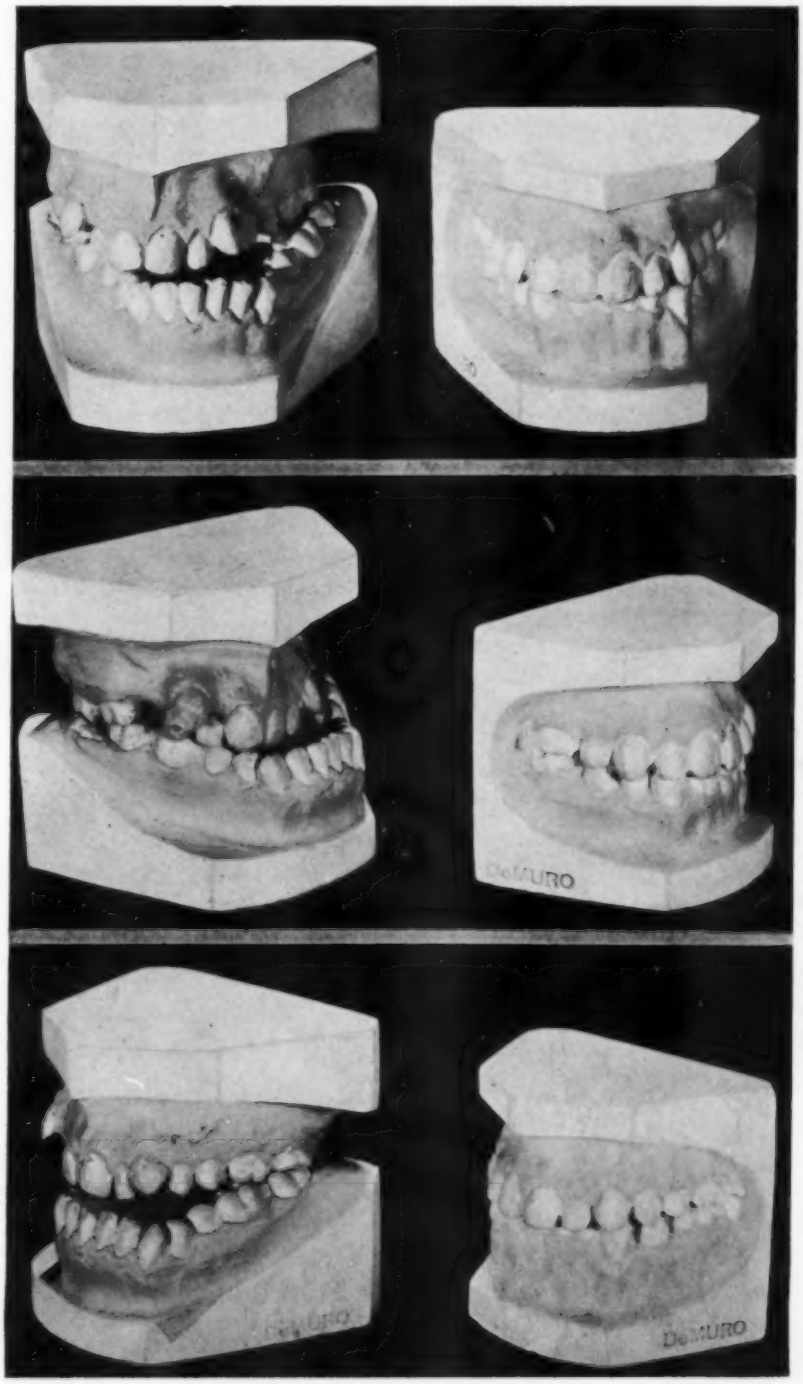

Fig. 11.—Plaster casts before and after treatment.

but we decided to take face bow registrations, and then build up the ascending rami from what we could see in the x-rays. That was done with low-fusing metal so that we could make the necessary cuts, and if they were not the proper direction, we could then fuse the metal together and make another cut.

Because the occlusal plane of the molars inclines upward and backward, the body of the mandible can be brought backward by lengthening the ramus. This was done by making the cut forward and slightly upward.

One of the questions that is often asked is that by bringing the mandible back whether we do not cause an embarrassment of the oral pharynx or push the tongue back too far. I have never heard of a case where that happened. You see, the tongue actually hangs in a hammock of the musculature that makes up the floor of the mouth, and even though you do bring the mandible backward there is enough leeway in that musculature so there is no worry as for the tongue.

In this case the subcutaneous resection was considered the best type of operation. Incidentally, Babcock formerly did an open section, and then would bring his parts in apposition and close it. We felt that there was absolutely no need for it, that by a simple incision beginning just below the tragus of the ear for about two centimeters in length, and pulling the parotid gland backward and introducing our needle around the posterior border of the mandible, bringing it forward, as you bring it forward you can feel the tip of the needle just about where your buccal pad is, and as Dr. Weiss said, that is where your incision is made.

As for the talk of so many dangers, the question is asked, What about the facial nerve, what about the parotid gland? As a matter of fact, both are drawn back out of position, and there is absolutely no danger of cutting them, that is, with a little care being taken, of course.

As for cutting the mandibular nerve, most of you have seen sections of how the mandibular nerve goes into the canal. It does not come down straight alongside the mandible, but comes in at an angle just as your internal pterygoid muscle comes in at a similar angle to the inner aspect of the mandible. Your needle hugs the bone closely so that there is absolutely no danger of cutting anything in the contents of your canal. I cannot think of any other dangers.

The question of non-union I think can be just put aside lightly, because I know of no case where an operation of this kind has been done. At least there are no cases in the Surgeon General's office in his records of any failure in this type of operation, and as long as you do bring the parts into fair apposition and there is proper fixation, which was stressed by Dr. Weiss, I do not think you have very much to worry about.

Dr. Walter C. Chapin.—How long from the time of the operation until the dismissal of the patient?

Dr. Weiss.—The appliances were removed about a year after the operation. In other words, the orthodontic treatment took about a year. I did mention there was no retention used, but the girl was put on the platysma exercise to keep the mandible retracted. She was also given the biting exercise, so we could hope that that mandible would stay in position. I saw her recently, and it is staying in fine position.

FACTORS IN ETIOLOGY OF MALOCCLUSION

WALTER J. SLY, D.M.D., BOSTON, MASS.

MUCH that is included in the following paragraphs has been said before and may seem elementary to experienced orthodontists. It is, therefore, with the hope that there may be enough of the elemental in the underlying principles to justify a repetition, that I have the temerity to present it for your consideration.

One of the most perplexing questions that can be asked of the children's dentist or orthodontist is the one so commonly put by the parent, viz., "What causes my child's teeth to be crooked?" Various means have been suggested to classify the numerous causes of malocclusion by placing them in groups, such as intrinsic and extrinsic, predisposing and immediate, and these do offer convenient means for classifying a long list of known and suspected causes. We are also informed by Lischer that defects which involve dental malocclusion may be classified according to degree.

The most severe are the true deformities, those gross tissue changes which result from glandular disturbance, interference with nerve supply, ankylosis, atrophies, hypertrophies, etc. These conditions involve occlusion of the teeth but are mostly problems of the physician or surgeon. The other extreme is those physiologic variations which follow the universal law of nature whereby no two units (blades of grass or petals) are alike or uniform; as stated by Darwin, "Nature is most careless with the individual but very careful with the type."

Between these two extremes are the dentofacial anomalies which constitute the majority of cases presented for orthodontic treatment and which we shall consider in more detail. The factors which contribute to these anomalies would seem to fall most naturally into somewhat broader groups and for purposes of discussion we may divide them into the (1) genetic or antenatal factors, (2) those having to do with nutrition or metabolism, (3) those in which function plays the leading role, and (4) accidental causes. This is essentially the classification used by Brash and may be further subdivided for convenience.

Foremost in any consideration of antenatal factors in the etiology of malocclusion would be the question of heredity, and it would seem that in such a common physical defect as malocclusion there would be no lack of convincing evidence of the effect of heredity upon the teeth and jaws. Certainly the striking similarity of some children to their parents as well as the almost identical malocclusion in identical twins would strongly indicate that such influence existed. The real problem, however, concerns those families in which the parents have reasonably good occlusions but the children develop distinct malocclusions. This condition may be the result of the intermarriage of different races or at best different types of individuals.

Read before the New York Society of Orthodontists, Nov. 12, 1940, New York, N. Y.

Johnson has produced similar experimental results by crossing bassethounds with bull dogs resulting in the most grotesque combinations of round heads and long snouts and vice versa. The law of unit inheritance is offered as the explanation for these phenomena as it is in man whereby the enamel organ is inherited from one parent and the jaws from the other. This is thought to be probable since the enamel and the bone derive from different germ layers.

A variation of this theory arises from the fact that since the maxilla and the premaxilla are formed from different processes in the fetal head disharmony or disproportion might occur which would cause a crowding of the anterior teeth. We thus find disharmonies between head and face, maxilla and mandible, premaxilla and maxilla, tooth and bone, according to the advocates of this theory.

Approaching the problem from the opposite angle, it is claimed that malocclusion is very rare in pure races such as original Laplanders, Hawaiians, Indians, etc. This conclusion is open to some question, since authorities tell us that there are no unmixed races and the dentitions of the primitive races may be reduced to states of malocclusion and decay in one generation exposed to so-called civilized living. Scientific proof is lacking in support of most of the evidence regarding heredity in malocclusion, and since man is, as Dr. Crew remarks, "a totally inconvenient and most unsatisfactory material for experiment," we must accept the fact that some of these anomalies may have their beginnings in the "shuffle and deal of the chromosomes."

Just as there may be, for example, perfectly good bassethound types and equally good bull dog types, there are humans whose hereditary lines, although normal in themselves, will not blend to form individuals that conform to our concept of the normal.

Certain totalitarian countries have eugenic programs which offer inducements for selected examples of pure racial stock to marry; the government to furnish free education and other advantages to their children. However, since no program of eugenic control is inaugurated here, the American melting pot will occasionally boil over with the results which we have noted.

It is not intended to imply that malocclusion is inherited as such, but that the predisposing cause or setup may be due to some antenatal influence. This is one argument in favor of very early treatment of certain types of anomalies in order that these tendencies or weaknesses may be compensated by establishing normal or increased function. As a case in point the so-called pseudo-Class III conditions start as slight underdevelopment of the premaxillary area but if neglected the bite becomes locked, and it is aggravated into a condition which is difficult to distinguish from a true Class III. Some of these corrections can be made very simply at an early age but require long tedious treatment if allowed to progress.

Fig. 1 shows the casts of a girl, 2 years and 9 months of age, whom I believe to be of this type. It is difficult to prove that any case of malocclusion is of antenatal origin, but when we consider that these incisors start to calcify at the seventeenth week of fetal life and the crowns are fully formed at birth, we may infer that the condition was present at birth. The mother states that the condition has been present since the eruption of the incisors. It is interesting

to note that the pamphlets published by insurance companies and other health agencies give as normal the sequence of eruption $\overline{1|1}$, $\underline{1|1}$, $\underline{2|2}$, $\overline{2|2}$. This case was corrected quickly and easily without intermaxillary force and has shown no tendency to revert. Increased function has been encouraged through myofunctional therapy and should influence future growth toward the normal.

Fig. 2*A* is in contrast to the previous one and shows the casts of a similar type of case. It was impossible to treat the case at this time and the opposite model shows the condition which has become a confirmed malocclusion and which would be classified as Class III at 15 years of age. Intensive treatment has restored the cusp relation to something near the normal, but it is doubtful if the influence of the malocclusion upon the development of the face can be completely overcome (Fig. 2*B*).

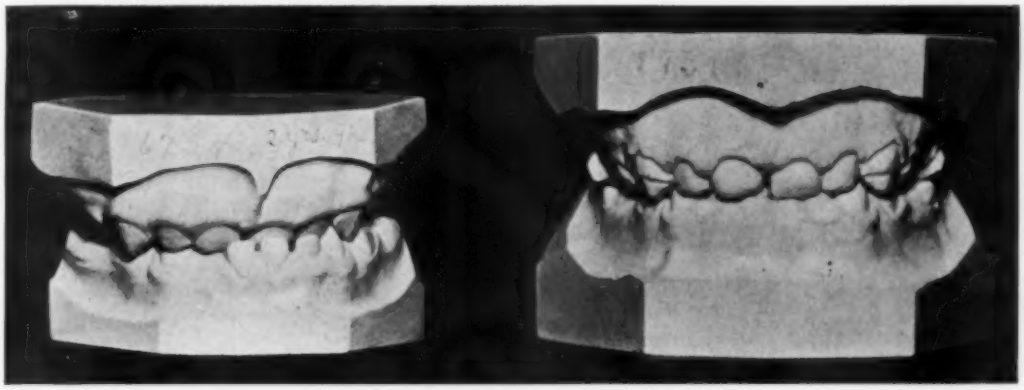

Fig. 1.

PRENATAL OR CONGENITAL EFFECTS

Much has been written concerning the prenatal care, nutrition, exercise, etc., in order that the child may have strong jaws and teeth. Although the later theory is that the child is a little parasite and will take what it needs at the expense of the mother, it is important from the standpoint of the mother's health that the necessary precautions regarding nutrition, exercises, etc., be taken. There has been considerable speculation also regarding various types of intrauterine and abdominal pressures and their effect upon the developing jaws, and, although it probably is a factor, it is impossible to say that it was the principal one in any given case.

Probably the most common congenital defect that we can positively identify as such is the cleft palate, a condition which is most difficult to treat orthodontically, and the cause of which is still not thoroughly understood. One of the most plausible explanations of this condition is one offered by Shaeffer, viz., that the tongue which normally occupies a position high in the mouth cavity before the fourth fetal month does not drop in time for the preosseous palatal process to unite. Cryer also mentions nutrition as a factor as well as the fact that the preosseous palatal processes are kept apart by the mandible which forms before the maxilla. I mention this principally because of the growing conviction that some of the lesser anomalies, which are difficult to explain, may possibly be caused by some similar interference with development in which the union of the various processes barely manages to "make the grade."

I believe the case shown in Fig. 3 to be such a one for, in addition to the crowded incisors, congenitally absent $\frac{5|5}{5|5}$ and impacted maxillary canine and large hypoplastic areas on the central incisors, this girl, 8 years of age, had a bifurcated uvula. Although there was no cleft in the bone the whole picture, and especially the bifurcated uvula, seems to suggest interrupted and retarded development in tissue that should be formed very early. The absence of the $\frac{5|5}{5|5}$ seems to be the attempt of nature to compensate for the lack of growth, and the reduced size of the arch harmonizes with the other features and forms what we must accept as normal for this individual (Fig. 4).

Fig. 2*A*.

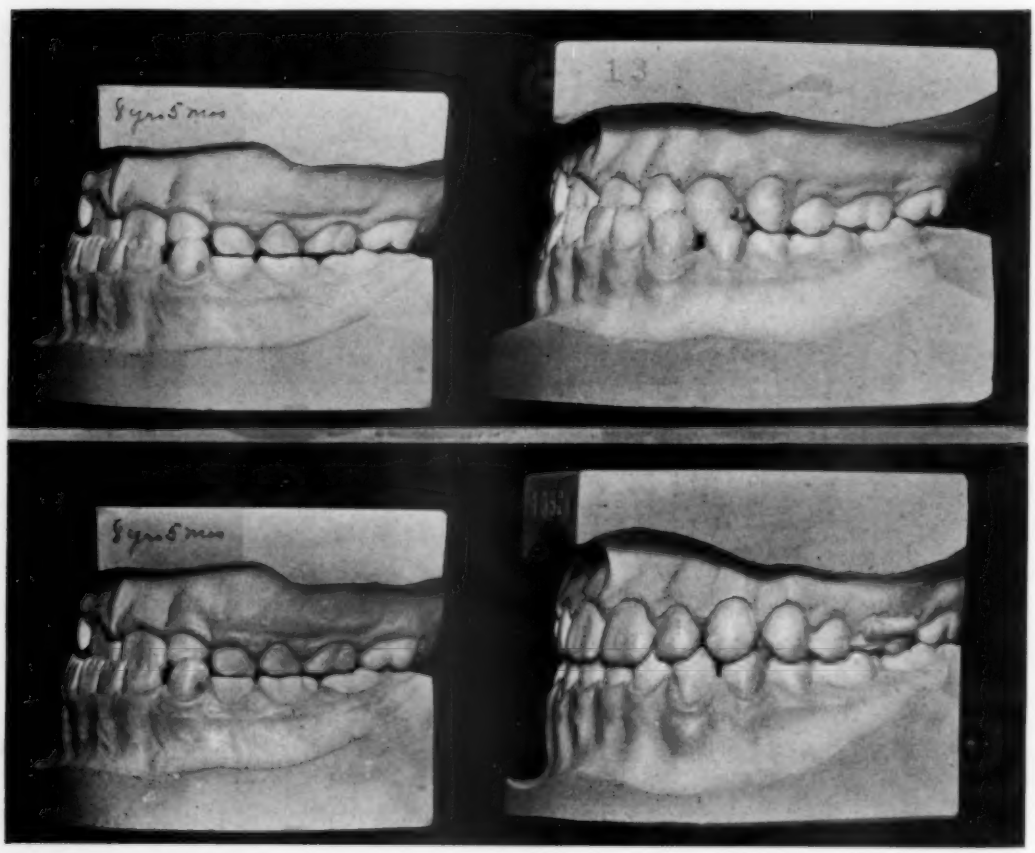

Fig. 2*B*.

Still another group of anomalies which may be classed with the antenatal group are those which are said to be caused by injury at the time of birth. It is often possible to recognize rather gross asymmetries of the jaws and even of the head as a whole which may have been the result of excessive force at the time of birth. In support of this theory, Dr. Raemakers of Iowa presents a series of cases which were examined at birth showing marked distortion of the anterior part of the maxilla. It is his contention that the practice of obstetricians of using the infant's mouth as a finger grip during delivery is responsible for this condition.

Since these antenatal factors do impose certain restrictions upon the work of the orthodontist and his correction cannot go beyond the limitations of the individual, it is well to recognize as many as possible and try to distinguish them from purely environmental factors, although much of it is still in the realm of speculation.

METABOLIC FACTORS

The dental profession has for the past several years been very diet conscious, indeed, it has been unusual to find a dental magazine or a society meeting that did not contain one or more articles or papers on some phase of metabolism, either calcium metabolism, endocrine, or the various vitamins.

It is fairly well established that certain minimum amounts of calcium and phosphorus, varying with age and sex, are required to supply the needs of the body and that these must be present under rather exacting conditions in order to be available for use.

Fig. 3.

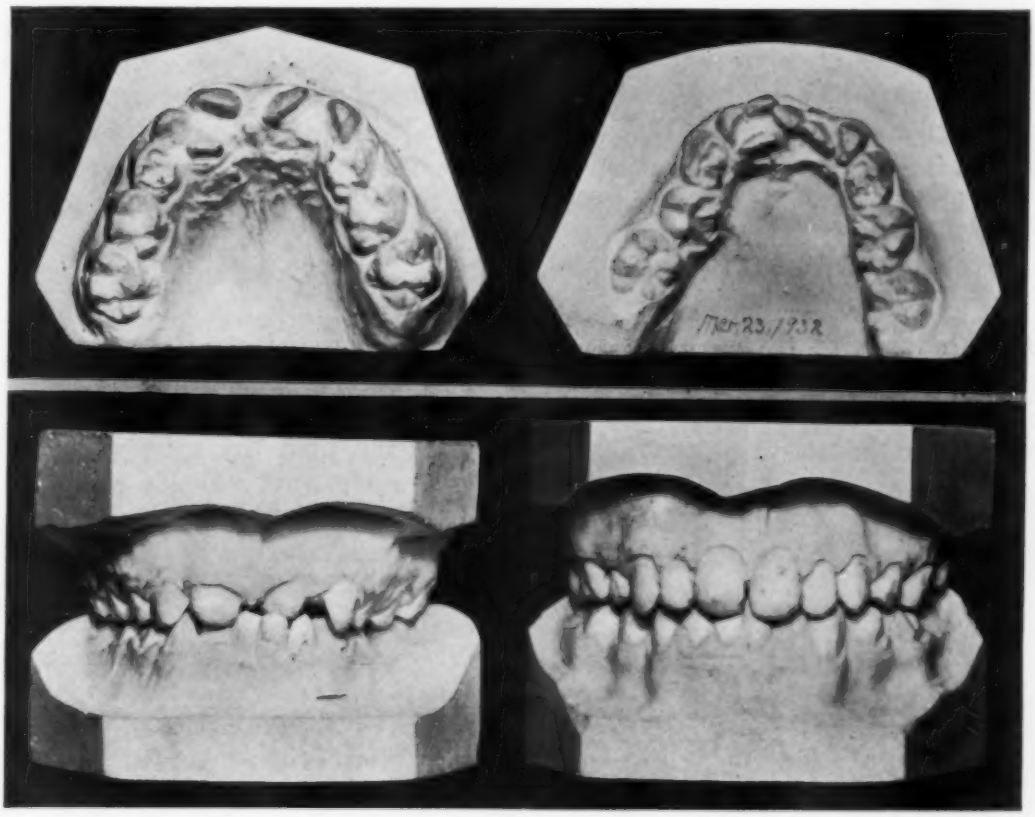

Fig. 4.

The keynote of these conditions seems to be physiologic balance. For example, Broderick states that the calcium must be absorbed in an acid medium, i.e., in the stomach, and in order to be further utilized in building bone must be combined in definite proportion with phosphorus. For as he further states, in order for these minerals to be converted into bone, there must be in addition to adequate mineral supply:

1) acid and base equilibrium
2) endocrine balance
3) vitamin D
4) ionic balance
5) fats and sugars.

When these requirements are not satisfied and there is mineral deficiency, it is obvious that the growth and development of the jaws might be retarded during such a period.

Even in normal individuals there is a kind of ebb and flow in the mineral metabolism of the body known as catabolism and anabolism, whereby the calcium is alternately stored and withdrawn. We also know that growth proceeds at different rates in different planes of the skull and at various points in the same plane. If a low point in the calcium metabolism should coincide with a period when growth would normally be accelerated in a particular area, it is reasonable to suppose that development in that portion would be retarded. The late T. W. Todd seemed to be of this opinion in the following quotation:

"The spongiosa is a network of bony trabeculae picked out in gray on the roentgenogram, the size of the mesh having a certain family pattern but liable to undergo modification in any individual from time to time. The interstices of the mesh are occupied by a delicate gray shadow of labile mineral. This is the 'floating' store from which the mineral is obtained for blood coagulation, muscle tone, kidney function and central nervous system. To the network of trabeculae and the enclosed labile mineral two modifications may happen, best expressed by the metaphor of snow-covered chicken wire. As the snow filling the interstices melts, the chicken wire mesh becomes more plainly visible and parts which have suffered corrosion stand out as breaks in the mesh. But if the melting snow freezes afresh the trabeculae become coated with ice. They may not appear thicker but will stand out more clearly and the places where the wire strands of the mesh are intertwisted appear as nodes in the network. Spongiosa well filled with mineral corresponds to the snow-covered net of chicken wire. Withdrawal of the labile mineral corresponds to the melting of the snow. Breaks in the trabeculae represent a heavier drain on the stored supply. Transformation of labile mineral into the more stable phase corresponds to the ice covering with knots or nodes in the network. Further modification by which the network becomes coarser and of more open pattern is evident at times in a growing child. But whereas fluctuations in the gray shade of interstitial mineral are frequent and take place rapidly, differences being readily distinguishable in six weeks, changes in size of mesh are of slow production and require a year or more for the development of a plainly discernible difference." From this it would seem that some of the anomalies which we see in older children may register a period of their development when their mineral account was much overdrawn. These periods do not necessarily represent definite illness, but may be something that the mother would refer to as an upset. It is sometimes possible to discover certain evidence of this imbalance in the mouth. Besides such obvious signs as caries, root absorption, etc., Strang points out that cases showing severe infraclusion are probably suffering from calcium deficiency. He also explains the heavy ridges of bone sometimes seen lying along the alveoli as the effort of nature to shore up areas which are subject to strain and which are poorly calcified. Certain neuromuscular symptoms as well as allergic conditions are also mentioned as evidence of disturbance in the calcium metabolism.

Fig. 5*A* shows a case which would be classed as a severe overbite or, as Simon would prefer to say, posterior attraction. This is the type of case which is said to record a period of mineral deficiency at a time when there should have been accelerated vertical growth from nine to twelve years of age. It is improbable that all cases of this type are victims of diets deficient in mineral, but rather that they fail to satisfy some of the above requirements for its assimilation and use. They are, as a class, of the sensitive fine grain, so-called high strung type of child which may suggest a clue, since the hormones which govern growth are under the control of the vegetative or autonomic side of the nervous system, and as Wolf states calcium ions serve to decrease nerve and muscle irritability. (This is contrary to sodium and potassium which increase excitability.) The smooth transmission of impulses from nerve to muscle across myoneural junction requires the presence of calcium. Its effects are exercised upon both skeletal unstriated muscle and upon both voluntary and autonomic nerve systems. There is evidence that calcium and phosphorus share in this function, the calcium ions governing the sympathetic and the phosphorus the parasympathetic. It seems that if calcium is in insufficient concentration, nerve impulses are transmitted in jerks rather than smoothly, etc.

A. *B.*

Fig. 5.

Noyes states that nature lays down bone as a sculptor applies his clay, laying on large gobs of material and trimming away excess bulk by absorption to a size and form only sufficient to carry the load. Fig. 5*B* shows where the excess ridges have been deposited but the trimming process has not taken place.

Unfortunately the present methods of calcium-phosphorus determination are rather complicated and involve considerable time and for this reason the clinical symptoms must be relied upon in most cases.

Broderick states: "In current medical practice facilities are not readily available for estimating the individual calcium balance. An estimate of the blood calcium does not give this information and a laboratory investigation of intake and output is a lengthy business."

The blood calcium evidently tends to remain constant at the expense of bony reserve. The writer has had the experience of referring a patient with clinical evidence of severe mineral deficiency to a physician for calcium-phosphorus determination and has had a report of normal. In the present state of the science it would seem that some practical method of evaluating radiographs as suggested by Todd and more recently by Dr. Francis of the Brush Bolten Foundation is the more promising method for use by the orthodontist.

FUNCTION

The whole structure of theoretical orthodontics rests upon the biologic fact that "the form of the bone being given, the bone elements place and displace themselves in the direction of functional pressure." This statement is Wolff's law as modified and simplified by Jansen. It applies to the bone as a whole but is more graphically demonstrated in the architecture of the trabeculae which have been called the crystallized lines of force, and which resemble closely the trajectories that an engineer might draw to represent stresses and strains of a material. It must be borne in mind that the process is a biologic one and cannot be reduced to strictly mechanical terms, as is so often attempted, but that a definite relation can be noted between the lines of the cancellous structure and the direction of muscle pull. Additional proof is seen in the fact that before any functional force is applied, as in the case of infants' long bones, the pattern of the trabeculae follows closely the lines of blood supply and does not change until the child begins to walk and becomes otherwise active.

Murray says: "From this history there emerge points of considerable importance. Firstly, the fact that the first architecture of the bone is, in both epiphysis and diaphysis, different from that found in the adult, and that the architecture only begins to show itself when the child starts to walk, suggests most strongly that the change is an adaptive one, therefore that the factor principally responsible for the architectural development of the adult spongiosa is functional activity, and that the cancellous structures produced in late fetal and early postfetal life are determined either without reference to functional stresses or with far less dependency on them than is the case in the later modifications."

Todd also distinguishes between growth with its simple increase in size and maturation which involves changes in proportion and shape and rate of ossification. The two processes normally keep pace with each other, but it is possible to have growth exceed maturation or the reverse. Each is said to be controlled by a different endocrine gland, the thyroid being the major influence in growth and the pituitary governing maturation.

Practical use is made of this distinction in the study of the hand as an index of development.

Time will not permit a full discussion of the relation of function to inherent growth forces, endocrine influence, and the process of maturation, but it is apparent from the foregoing facts that the development of the jaws to their full size and form must depend to a large extent upon normal muscle action.

We may consider the subject of abnormal function as being divided into two groups, the cases of dysfunction comprising the first group in which the lowered tone level is reflected in poorly developed arches, faulty arch relationship and a general weakness and lack of control of both muscles of mastication

Fig. 6.

The blood calcium evidently tends to remain constant at the expense of bony reserve. The writer has had the experience of referring a patient with clinical evidence of severe mineral deficiency to a physician for calcium-phosphorus determination and has had a report of normal. In the present state of the science it would seem that some practical method of evaluating radiographs as suggested by Todd and more recently by Dr. Francis of the Brush Bolten Foundation is the more promising method for use by the orthodontist.

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A.

B.

C.

D.

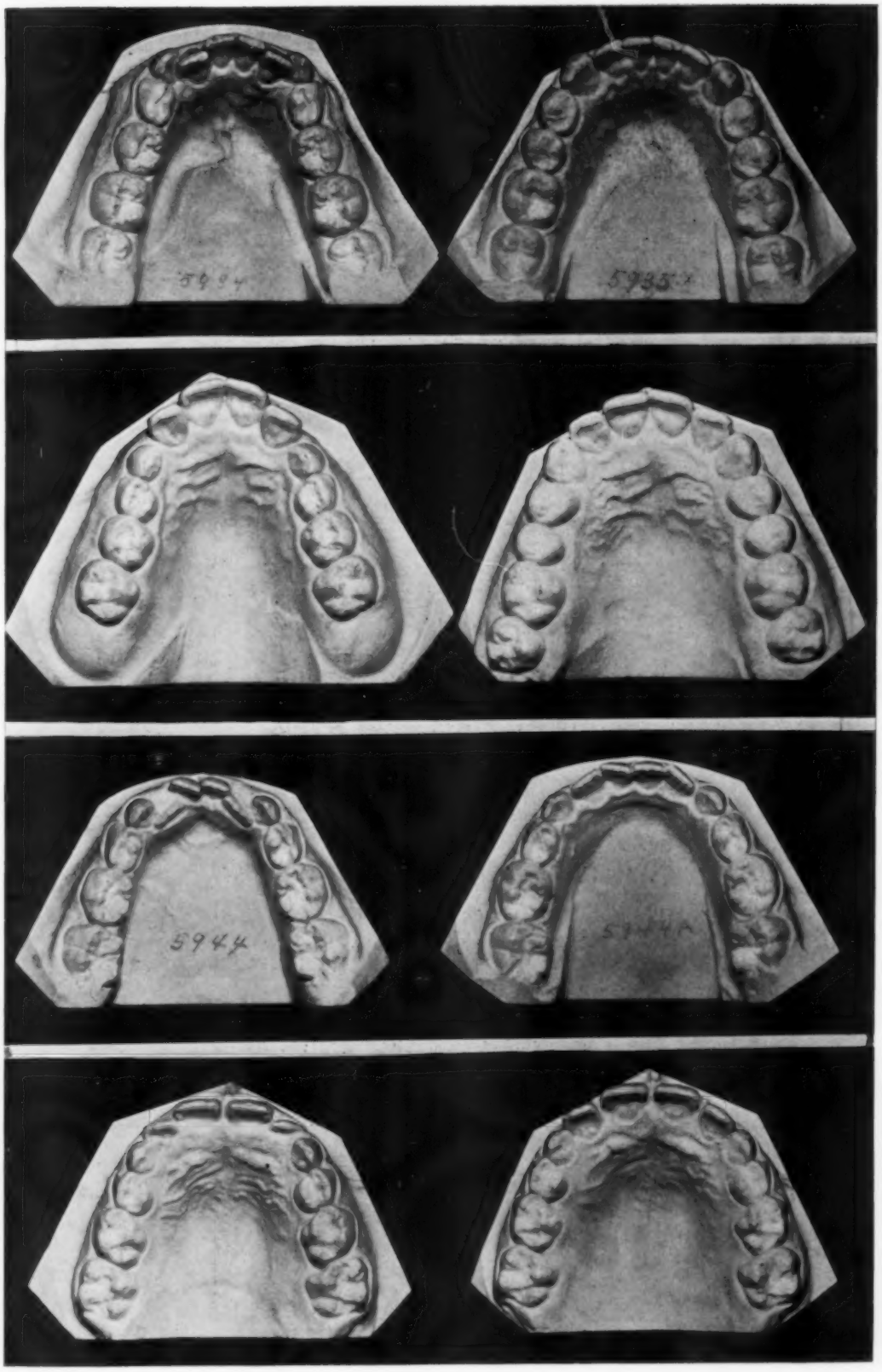

Fig. 6.

and expression. The muscles of the second group in which function is perverted are usually strong enough, but the forces are misapplied in such a way as to produce disproportions and disharmony of the bony structures and soft tissues.

Examples are found in the perverted action of speaking and swallowing as well as the action of the buccinator mentalis and tongue.

Figs. 6, 6*A*, 6*B*, and 6*C* illustrate the type of case that can be helped by increasing the function as an aid in developing arches. Skeletal growth had taken place very rapidly in this patient but muscular development had not kept pace with it, and the muscles of mastication were very soft and poorly toned. Interferences were removed in $\underline{2|2}$ and lower lingual wire applied. Myofunctional therapy was applied, and the upper arch shows an increase in $\underline{6|6}$ widths of five millimeters. This might be called an example of dysfunction.

Fig. 7 shows a typical case of perverted muscle action which is so commonly seen. It is cited merely as an example of misapplied function. The model on the right shows the overbite reestablished after the discontinuance of the habit.

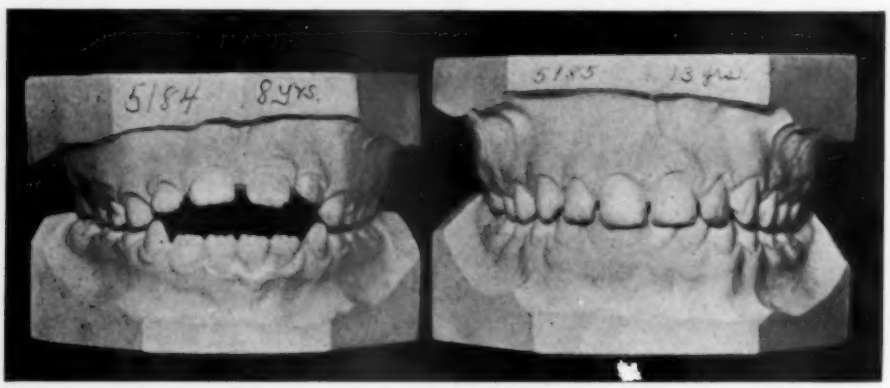

Fig. 7.

POSTURE

The mandible is not an integral part of the skull but is peculiar unto itself in both origin and development.

Therefore in considering any anomaly that involves the position of the mandible, we should not forget the importance of posture. If we accept Lord's analysis of the mechanics of the temporomandibular joint, the matter of posture takes on added significance. It is convenient to think of the mandible as being suspended by two slings formed by the masseter and internal pterygoid muscles. Simple opening of the mouth is accomplished by the contraction of both external pterygoids with the stylo-mandibular ligaments and spheno-mandibular ligaments acting as a fulcrum and causing the mandible to rotate on a horizontal axis at the level of their insertion. Likewise the mouth is closed by the combined action of masseter-temporal and internal pterygoids causing the mandible to rotate about this same horizontal axis. Trituration is accomplished by the action of one external pterygoid balanced by the above-mentionel slings.

Lord does not consider the temporomandibular joint as a hinge, but merely as a sliding track with the meniscus working in conjunction with the head of the condyle to produce a smooth gliding motion.

Lord's model illustrates graphically the idea of a suspension system. There is no actual connection at the temporomandibular joint but the mandible is held in position by the above-mentioned sling and the balanced tone in the antagonistic groups such as external pterygoids and temporal muscles (digastric and masseter).

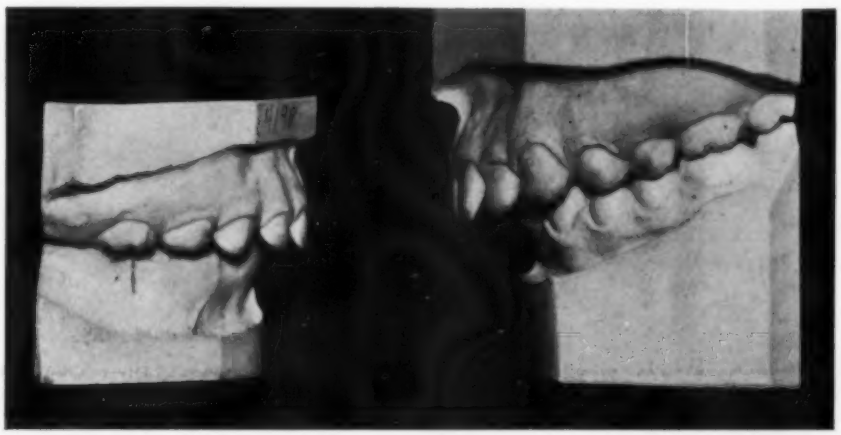

Fig. 8.

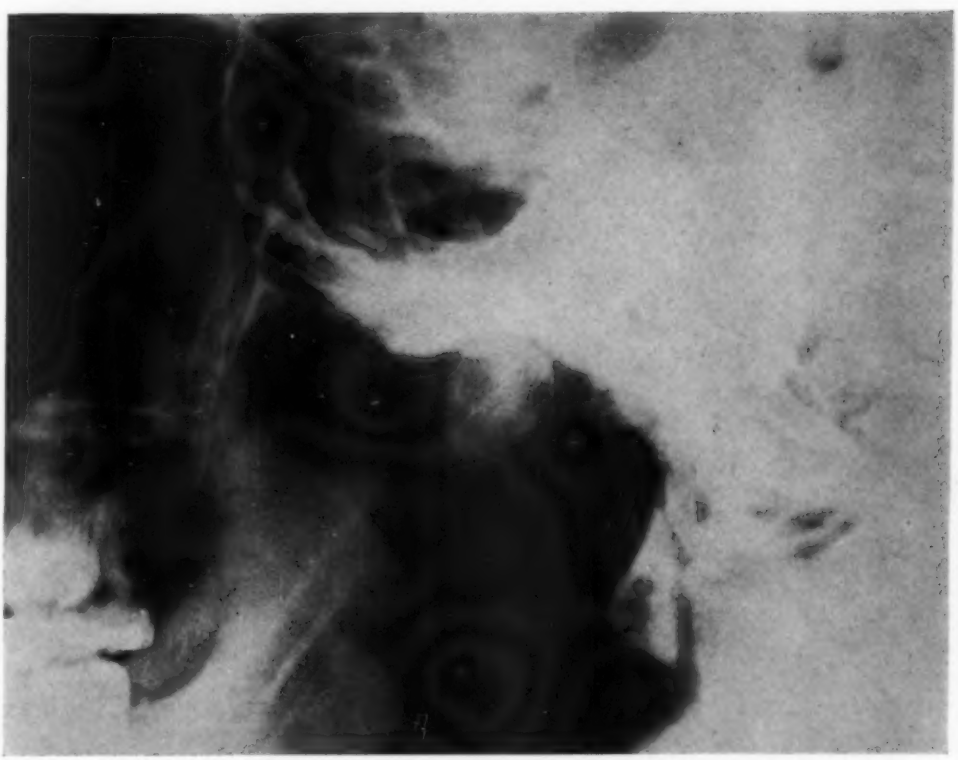

Fig. 9.

Figs. 8 and 9 are intended to illustrate the role of posture in two widely differing types of distoclusion. The first we may term the flat or horizontal

type with its low eminentia and shallow fossa in which the action seems to be principally in a mesiodistal direction.

There is practically no curve of Spee and the cusps are very flat. This is the type in which the external pterygoid muscle is weak and hypotonic; in fact many children have such poor control over this muscle that they are unable to hold the jaws apart more than a few seconds without fatigue. One of the principal objects in treating this type of case should be to restore the tone in the external pterygoid.

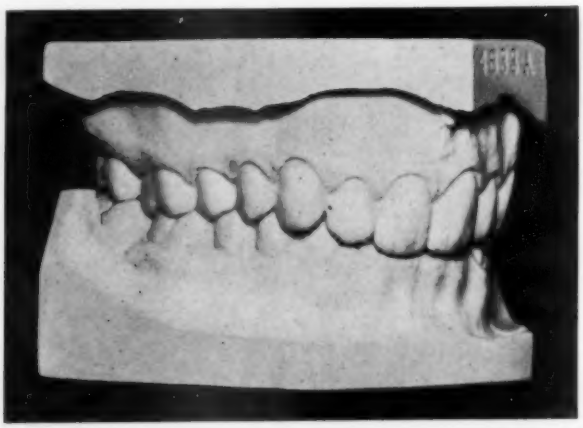

Fig. 10.

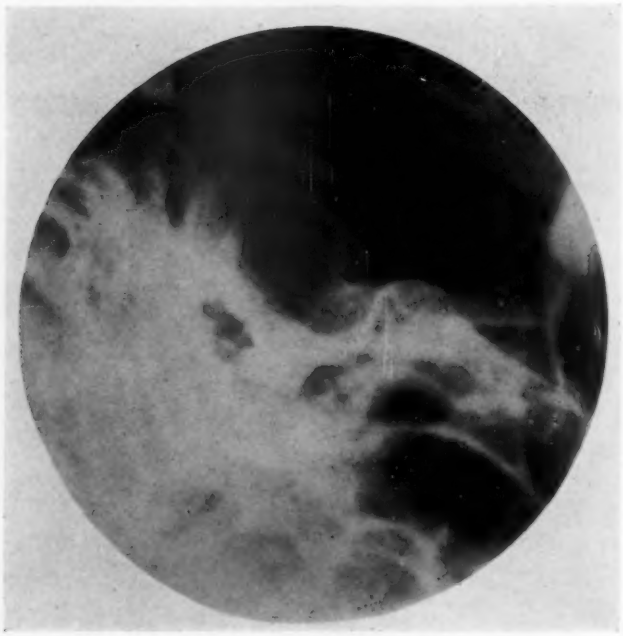

Fig. 11.

On the opposite end of the scale we have these cases in which the mechanical train is composed of steep nearly vertical surfaces, Figs. 10 and 11. The deep fossa and high eminentia, sharp curve of Spee, and deep cusp combine in an action which is predominantly vertical. We should expect to find those muscles which act in a vertical direction to be hypotonic and poorly coordinated

in conjunction with retarded vertical growth. This seems to follow out in practice for it is this type of case that responds so nicely to treatment by means of bite planes and muscle training.

It will be seen from this very brief description that the positioning of the mandible depends upon the normal tone, the balance, and coordination of this complex suspension system as much as upon the size and form of the arches.

Fig. 12.

Fig. 13.

The subject of habits and reflexes comes properly under the heading of misapplied function but is such a vast field in itself that it can only be

mentioned in passing. Likewise the beneficent circle of tone and exercise upon which rests the principle of myofunctional therapy could not be treated within the scope of this paper.

The principle of function as a causative factor in malocclusions is so generally accepted as not to require proof, but the above facts are presented merely as illustrations.

Figs. 12 and 13 are examples of poor muscle tone or dysfunction in muscles of expression, particularly the orbicularis oris. The effect upon these muscles which insert into the orbicularis oris is also noticeable and a change in the expression of the whole face is noticeable.

Aside from these larger groups of etiologic factors there remain certain others which may be listed as accidental causes. These include such conditions as: early loss of deciduous teeth as well as their over-retention, supernumerary teeth, and congenitally missing teeth. Loss of space through decay of approximal surfaces or excess width due to overcontoured fillings or ankylosed deciduous molars offer mechanical interferences to the developing occlusions. Abnormal frenum labium also may be listed.

Many of these causes overlap in various ways. For example, the antenatal factor might well affect function or nutrition through inherited malformations of the jaws. Malnutrition might on the other hand predispose toward inefficient functioning as it is well known that the lack of certain elements, notably calcium, does affect muscle tone and posture. Or the order might be reversed with a poorly functioning dental equipment affecting nutrition because of improper mastication.

From these somewhat random facts it will be seen that there are still many factors in the etiology of malocclusion which are obscure. And we cannot say with conviction that a given anomaly is due to a definite and specific cause, since they may be the end result of an episode in a much earlier period of growth.

It would seem then that the solution to the problem is to strive to recognize the hereditary growth patterns and the other antenatal, nutritional, and functional influences upon growth and development, and avoid being too dogmatic in our answer to the still imponderable question, "What makes my child's teeth crooked?"

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THE NEXT TWENTY YEARS

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AS TITLES are ofttimes misleading, may I at the outset assure anyone who may think he is about to hear a prophecy, that such is not to be the case. If your essayist were a prophet, the demand for his services abroad would, no doubt, have removed him from these shores long ago.

I have been asked to present a paper on the future of our specialty, treating the subject both from the mechanical angle, including myofunctional therapy, and from the social aspect. How can we do the most good for the greatest number of children? As to what the future holds for us, we should maintain the highest hopes. On what would these be based? On our past history. We have come a long way in the last twenty years, but we must not get overconfident, there is still so much room for improvement.

This paper is divided into four parts: postgraduate instruction, mechanics of orthodontics, myofunctional therapy, and the social aspect, reviewing briefly the lessons learned in the past and trying to interpret them for the future. My observations will be taken mostly from personal experience and by way of introduction to the first point which I wish to discuss, may I be pardoned in relating a matter of past personal history.

Since 1915, as a student with the late Martin Dewey, it has been my privilege to be periodically exposed to the personal teachings of some of our outstanding men in orthodontics, either in conferences or in intensive extension courses.

At the beginning of a conference group at Nashville, Tenn., some years ago, all that the three men asked who were giving of their time and effort to a group of young orthodontists from all over the States was, "Throughout this conference, keep an open mind." That was not only sound advice then, it still is, and may I say that after being given first hand the philosophies of Mershon, Johnson, Oliver, Rogers, Lischer, and Strang, I could not help but be imbued by the sincerity and character of every one of these men. And so when I hear such strong differences of opinion expressed on certain mechanical phases of orthodontics, I cannot help but feel that if the philosophies of these men were better known, greater benefits would accrue to orthodontics.

POSTGRADUATE INSTRUCTION

As universities have rightfully taken the place of privately controlled schools for postgraduate instruction, I feel there should be more diversification in the different teachings and techniques of orthodontics. Such procedure has for some time been adopted in one university, as was told us by the head of its orthodontic department, Dr. Waugh, in a paper presented before this Society three years ago.[1] For practicing orthodontists, extension courses were instituted at Columbia in 1927 and I have learned that since that time fourteen courses have been given, a total of three hundred orthodontists have taken the courses, and they have come from thirty-nine states and from three foreign countries.

Read before the New York Society of Orthodontists, New York, N. Y., Nov. 11, 1940.

Think what that has meant to those orthodontists who could come on to New York, and think what it would mean if other universities could likewise give extension courses for the benefit of men in their localities.

I am sure there are many in this room today who have at some time found themselves in a very serious quandary as to whether the method they had been taught, and were using, was the best for the particular case in hand. Until such extension courses as above mentioned were instituted, recourse to the literature was the only thing available to the orthodontist, outside of discussing his problems with some orthodontic friend, and, if the friend were from another school of orthodontic teaching, this procedure was not always so simple.

One of the greatest things for the future of orthodontics, in my opinion, will be not only the willingness but also the desire, on the part of the different schools or groups, to become thoroughly acquainted with each other's philosophies and techniques. If they did, with that spirit of open-mindedness, I think they would be willing to admit and make use of the good to be found in the other fellow's teachings, and in addition to the fundamentals of orthodontics their postgraduate students would go out with a rounder knowledge of orthodontic techniques and philosophies, and a greater sense of open-mindedness for future study.

MECHANICS

Mechanics, we must all admit, will ever be necessary in a certain percentage of our cases, and while the pendulum swung back and forth as to the amount and kind of appliances to be employed, with the attending opinions as to the manner of tooth movement which could be expected of them, other problems also presenting themselves in this connection brought out some very important research. I refer to the problems of retention in which we were asking ourselves if our appliance therapy had been instituted at the best time. Howard's investigations on endocrine disturbances were most valuable in determining if and when to render appliance therapy; and the studies of Hellman, Todd, and many others helped us in determining the best developmental ages at which to give appliance treatment.

Next came gnathostatics with the claim that it would aid us in determining the direction of tooth movement necessary in cases of malocclusion and, by thus restoring them to their correct relationship to skull anatomy, give promise of more permanency of our results. This was about the time that the more complex appliances were being most strongly condemned and the swing was to simpler types. I recall that my personal reaction to gnathostatics was that, while I felt that it did show me the faulty relation of the dentures to skull anatomy, it left me rather out on a limb in knowing how to correct that condition with the appliances that I was then employing. This, as you may surmise, was mostly in connection with the so-called Class II, or distoclusion, cases.

I, therefore, made a survey of all cases under treatment and found that, while I was pretty well satisfied with the progress of the neutroclusion cases, the distoclusion cases were giving me some real trouble. I was familiar with all the criticisms I had heard, and perhaps contributed to, of the so-called rigid appliances, but I had also seen some of the fine results obtained by men who really knew the mechanism; and with the one thought in mind that if I could

bring up my average by getting better results in that one group of cases that was giving me trouble, it would be worth while to try this type of appliance.

Since taking that step may I give you my reactions. I feel there are certain types of cases that do present a mechanical problem, requiring tooth movement which calls for the most stable anchorage that it is possible to obtain and maintain; and if we wish to bring about the best possible result in this type of case, not only at the completion of active treatment but also as the final result, we must turn to the more complicated appliances. I have not found the matter of conspicuousness so important to the patient, as the period of active treatment with this type of appliance is of shorter duration than the less conspicuous type. As to cleanliness, if the patient cannot keep the teeth clean above and below a properly fitted and cemented band, could we expect him to keep the enamel surface of a tooth clean under an arch wire which is continually in contact with the tooth itself? Naturally one would not pick an uncleanly mouth in which to place extensive bands or allow a child to wear such an appliance if the child could not maintain thorough prophylaxis.

The term rapid tooth movement is often misinterpreted. Its advocates do not mean the rapid movement of individual teeth, but rather the mass movement of teeth which is made possible by the construction and action of the mechanism, hence the shorter time required in the wearing of this type of appliance. As to long retention being necessary after this manner of tooth movement, may I say that I have more often found the reverse to be the case and this maintains in Class I, or neutroclusion, cases, as well as in Class II cases. Experience has led me to agree with the principle that if malposed teeth cannot be placed in their correct axial positions and relations to one another, we cannot expect nature to do too much in bringing this about.

In regard to the lighter appliances, I would just as strongly urge that their value be better appreciated by the men brought up in the use of the more rigid type. There are so many types of cases that do not present complicated anchorage problems that to see extensive appliances employed in such instances makes the criticism of such a procedure wholly justified, and does much to bring on undeserved condemnation of the mechanism as a whole and the teachings behind it.

Now a word about technique. Considerable has been written of late about orthodontic limitations and failures. I am wondering if in some instances this information has not been misinterpreted. To say it another way, has it not sometimes been employed as a simple means of letting us down easily on some results of treatment of which we were none too proud?

Woodbury says: "An interest in the biologic approach is no excuse for sloppy technique. Growth or its aberrations may effect unpredictable changes during the course of any treatment, and it is impossible to know precisely how much of the change that is taking place during treatment, be it desirable or otherwise, is due to the operator and how much is due to nature. When changes occur that are undesirable, it becomes the duty of the conscientious operator to face the matter as uncompromisingly as possible as he endeavors to find out how much is due to factors over which he has no control and how much may be laid at the door of his poor judgment or unskillful manipulation. Only the lazy operator will lightly blame nature for his own mechanical inefficiency."[2]

The young man just starting out must, of course, be told of the limitations of treatment so that in his enthusiasm he will not attempt or promise too much. However, I think he should be told to guard himself at all times against letting himself off too easily in cases that may not turn out as well as he had hoped. Heredity, endocrine disturbances, individual variation, limitations, etc., all have to be reckoned with, but unless we have reason to believe that they are involved in our so-called failures, should we not feel challenged to review most carefully the case in question, and be sure that the failure was not ours instead of nature's?

In a paper entitled "Failures in Orthodontic Treatment," Hellman writes: "Failures due to inability to carry out successfully the measures indicated are, perhaps, the most numerous in orthodontia. . . . In my estimation, this group of failures should be the least if the skill and proficiency of the orthodontist are what they are cracked up to be and if the treatment of a case is exclusively dependent upon them alone."[3]

Agreed that we have sufficient appliances to meet our needs; but are we as careful in our technique as we could be? The other day a patient from another city came in with as nicely made an appliance in her mouth as one could ask for. In getting her history it evolved that she had been treated by a general practitioner and the appliances were made by an orthodontic laboratory. Now admitting that a poorly made appliance in the hands of an experienced man is better than a well-made appliance in the hands of one who is inexperienced, should we not go one step further and say that when the general practitioner looks into the mouth of an orthodontic patient, should he not have reason to feel that a specialist is treating the case? Busy practices do not always make for the most painstaking technique, unless the operator has schooled himself in this. Again, are we rendering the most efficient service to the patient by having carefully planned our treatment step by step, recorded it, and then followed it?

Let me draw a picture of a busy orthodontist in the latter part of a full afternoon. The reception room is full, the operator is behind in his appointments, and he looks in the mouth of the patient just seated, and then looks at the models. At the institution of treatment, he outlined on the card what had to be done, but in no successive stages. Now let us see, what did he do last time, the appliances seem all right; nothing loose or uncemented. Take another look at models, now another glance in the mouth. There goes the door buzzer again with another patient coming in. "All right, Mary, I will see you again in three weeks." Now does that mean anything to you? It does to me, for I am drawing this picture from memory and at the end of a day I had seen a lot of patients, but what had I done for them? No harm, at least, perhaps you say. And isn't such an afternoon tiring?

Compare this picture with one in which a careful case analysis has been made, detailed treatment has been noted and followed. The operator knows just what he has done and what he proposes to do. That does not mean that he has to make an adjustment at every appointment, nor do things always progress as he had planned. But at least that case is progressing as steadily and in as orderly a manner as it is possible. To the operator who has not followed this

procedure, this may all sound very complicated, but let me assure him that at the end of the day he will not feel as tired for he has really accomplished something.

MYOFUNCTIONAL THERAPY

Here is a phase of orthodontic treatment that should occupy a whole paper itself, due to its importance, rather than be given only a part of it. Looking back on the early days of this valuable contribution to orthodontic progress, one of the greatest difficulties that the acceptance of myofunctional therapy appeared to have in the earlier teachings of Rogers was the misconception by so many men that it was being substituted for appliance therapy. It is true that in the very young cases where appliances could not be used, some myofunctional therapy was beneficial; but in all instances at a later age of the child, when mechanical interference of the teeth was present, with the jaws held in their normal mesiodistal relationship, these interferences were relieved by simple delicate appliances, and then the muscular development was instituted.

For many years now men who have had the faith, the diligence, and the patience to give sufficient time, thought, and study to this phase of orthodontic therapy, which still has boundless potentialities, are receiving their due reward in the service they are rendering their patients. Men of all different schools of orthodontic teachings are at least pretty well in accord on this particular phase of orthodontic therapy. Its value is stressed in every modern textbook of our specialty and has been covered in many papers presented and articles written by its originator, Dr. A. P. Rogers. When it comes to predicting what the future holds for us in orthodontics, I should say much, in view of what is unfolded to us as we learn more about myofunctional therapy.

SOCIAL ASPECT

The social aspect in connection with the future of orthodontics presents this question: How can we do the most good for the greatest number of children? This might be discussed from two different angles: first, in private practice; second, in institutional clinics.

Floyd E. Gibbin in 1936 had this to say: "If our profession is to attain the highest goal of useful service, then it must devise ways and means of providing orthodontic service for the 95 per cent of the population who earn only a modest income."[4]

He then went on to suggest that in our private practice, while maintaining the highest quality of service, we endeavor to develop a greater personal and office efficiency, thereby producing orthodontic service at a lower cost, in order that fees might be brought within the reach of a greater number of patients. Now on this point, might not this question be asked: Is it not usually true that in all walks of life the man who enjoys his vocation is the one who usually does the best work at it? While some orthodontists are happiest with everything clicking in their office like an assembly line in an automobile plant, others could not carry on this way and do their best work.

Extensive educational publicity among both the dental profession and the laity regarding the beneficial results which may be accomplished through the interception and prevention of malocclusion was also suggested by Dr. Gibbin, and since that time, as we all know, much has been done in this endeavor.

In the cities where there are dental schools or clinics such as the Eastman or Forsyth, the poorer classes are receiving some orthodontic service, but as in all branches of the healing art, the middle class really gets the least charitable consideration. They cannot afford the specialist and do not feel inclined to ask for help in clinics. Nor should they, in my opinion; and we as a profession can do much for them and the good name of our specialty by giving some of the less valuable hours of our day to rendering the necessary service to them. By thus making it financially possible for these people to have our services, I have found them more than glad to make the effort of getting their children to the office mornings, other than Saturdays, and furthermore we find them the most appreciative parents that we have to work with.

Comparing this with giving our time to clinic work, it is my opinion and experience that, except in such a field as fracture or cleft palate service, more can be accomplished and our efforts are more appreciated in our own office in the manner just given than in a clinic.

Before concluding this paper, I wish to discuss one further subject upon which I feel the future of orthodontics is most vitally dependent, namely, the orthodontist's obligation to the patient, the parent, and thereby to the specialty of our profession.

Occasionally a child while away from home will need some repair or adjustment made to his appliance, and the mother will ask the orthodontist to whom she has been referred, "How much longer do you think this has got to go on?" After many long years she is discouraged, and it takes only a split second for him to be equally, if not more, discouraged, after looking the rigging over. So thinking, but never mumbling to himself, that he does not blame her for her loss of faith in orthodontic treatment, he puts on his best professional manner and gives her the stock answer. Now you know what he sees. Perhaps, a poorly fitting band loose, or an appliance that has to be remade and reshaped in the mouth, and when it is all done he wonders what good it will be, or was. Seriously, though, should such things be in a specialty such as ours? Are they fair to the patient, parent, or orthodontics?

In my opinion, patients should not be sent away to schools without proper reference to another orthodontist which should include original models, etc., and the plan of treatment, step by step, if the referring orthodontist wishes to retain the responsibility of the case. In most cases where the patient goes away to school his orthodontist can plan on seeing very little of him from then on, for the vacations during the school term are short and infrequent, and then when summer comes, he is away again. I have always thought it more fair all around in such instances to turn the case over to the man who could carry on the treatment eight or nine months of the year. Let him manage it his way in all details, the first man giving him all phases of the case, even to the financial arrangements. Quite naturally the parents may feel that they prefer to continue and have the work finished by the orthodontist who started the case, and by being turned over to another they have a feeling of being tossed around. How many times, however, have we seen their wishes carried out with the case prolonged and no progress made and much dissatisfaction finally resulting.

We owe it to the layman to explain what is best for his child, giving him the benefit of our experience in such cases. He will see it the right way if we will take the time to discuss it with him from every angle, and he will be grateful to us in the end.

SUMMARY

A summary of the suggestions made in this paper might be as follows:

1. More diversification of teachings and techniques in postgraduate courses. Adoption by the universities of extension courses for practicing orthodontists.
2. A recognition and desire to make use of what is of real value in the other fellow's teachings and appliances.
3. Resolve to get more out of myofunctional therapy by putting more time and thought into it.
4. Try to do more for a greater number of deserving children by utilizing the less valuable office hours of the day.
5. Appreciate your obligation to the patient, the parent, and orthodontics.

In closing, may I quote a few lines which I found in the front of *Three Score Years and Nine* by Dr. C. Edmund Kells:

Yesterday and its mistakes are history,
Forget them not.
Tomorrow is a mirage—is always afar,
Count not upon it.
Today—this glorious day—is here, is yours,
Make the most of it.

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155 ANGELL STREET

OPEN-BITE ASSOCIATED WITH A TONGUE HABIT

Case Report

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THE case to be presented is interesting because it is an open-bite case associated with a tongue habit.

The patient, E. C., was a negro girl, 13 years, 5 months old when treatment was begun (Fig. 1). She presented herself at the Orthodontic Clinic of New York University for correction of a malocclusion.

On examination the patient was found to have a marked open-bite; the opening is 5/8 inch between the incisal edges of the maxillary and mandibular central incisors. This open-bite was found to involve the region of the canines and premolars, as well as the incisors. The maxillary first molars and the mandibular second molars were the only teeth in occlusal contact. Both mandibular first permanent molars had been extracted and the maxillary second permanent molars were unerupted at this time (Figs. 2 and 3). It was found on observation that the tongue was lodged between the maxillary and mandibular teeth (Figs. 4 and 5).

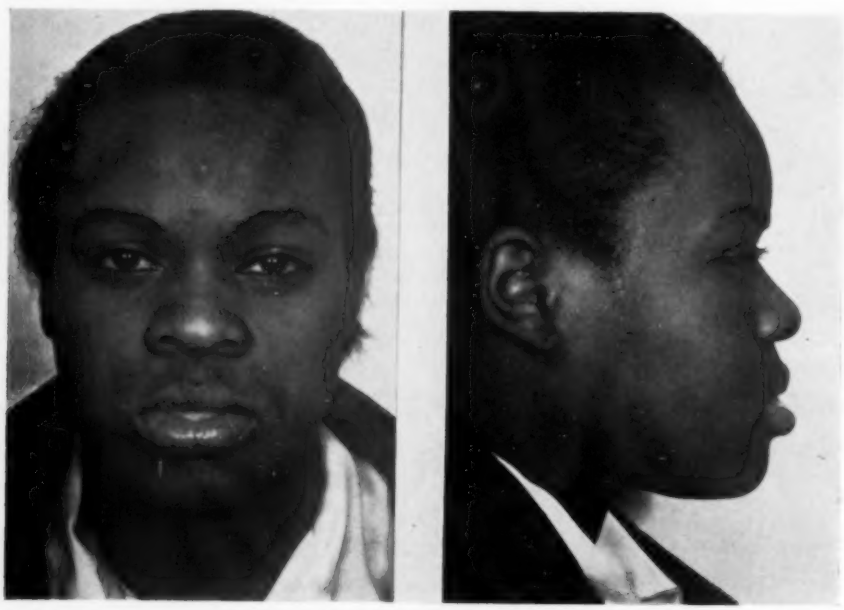

Fig. 1.—Full face and profile views.

The case was classified as a mutilated Class I, according to Angle. The history reveals the following facts:

Birth—Cesarean section

Weight at birth—9½ pounds

Infant feeding—Breast fed—1 year; bottle feeding—an additional year

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Read before the New York Society of Orthodontists, New York, N. Y., Nov. 12, 1940.

Contagious diseases—Measles, diphtheria, mumps
Other illnesses—Frequent colds
Habits—Mouth breathing, tongue sucking

The adenoids and tonsils were removed at an early age.

Etiology.—The tongue habit is sufficient to account for the entire disturbance, and the history reveals no other factor to which this condition may be attributed. The malocclusion is further complicated by the loss of the two mandibular first permanent molars.

The general plan of treatment was to encourage the downward growth of the bone structure supporting the maxillary teeth and upward growth of the bone structure supporting the mandibular teeth which were in infraclusion, thus tending to establish occlusal contact. It was further decided to tip the mandibular permanent second molars into their correct positions.

The appliances used were maxillary and mandibular round labial arch wires, .040 inch. These were placed into tubes attached to the buccal of the mandibular second permanent molars and maxillary first permanent molars. All of the teeth were banded, eyelets were placed on the buccal and lingual aspects of each band. Intermaxillary hooks were placed on the upper and lower arch wires in the region of the canines.

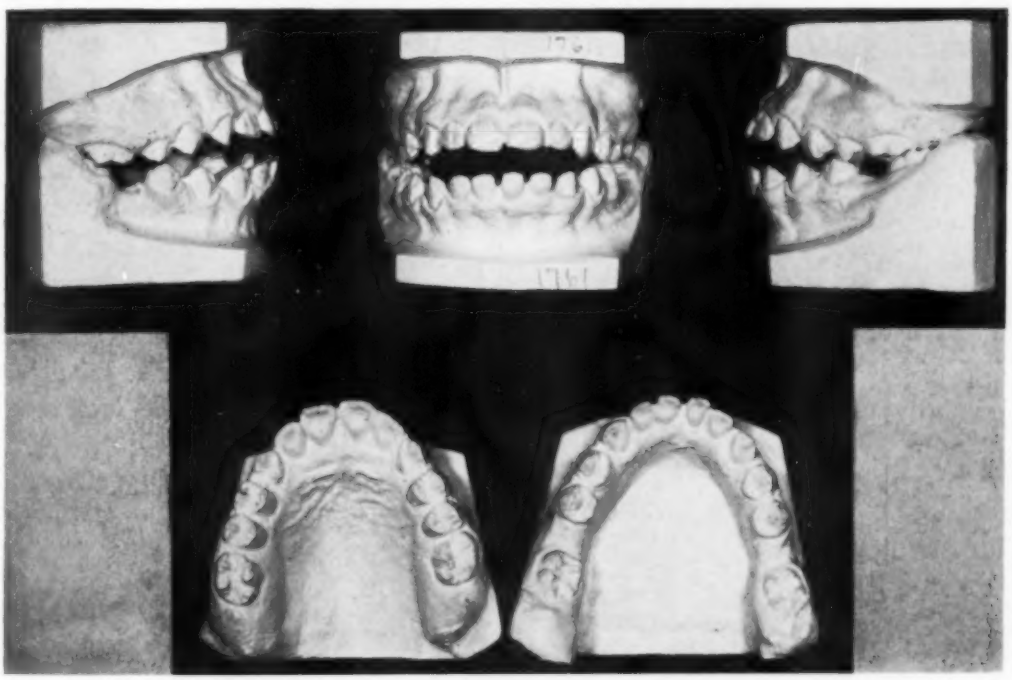
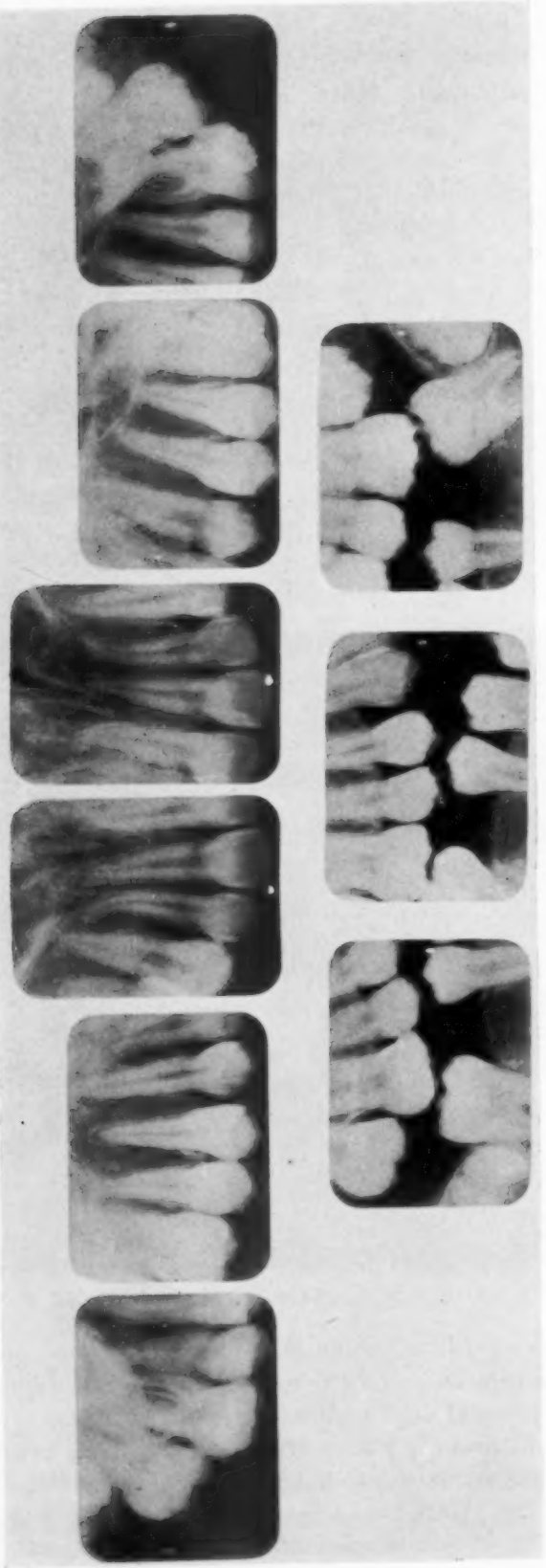


Fig. 2.—Casts of case at beginning of treatment.

Adjustments were made with the labial arch wires to encourage growth downward in the maxilla and upward growth in the mandible. In this way the premolars were brought into occlusal contact. The use of intermaxillary elastics was started to prevent undue strain on the teeth used as anchorage. The object of the adjustments was to tend to neutralize the action of the tongue until such time as the relationship between the maxillary and mandibular teeth would enable the patient to more readily keep the tongue in normal position.



A.

Figs. 3*A* and *B*.—X-rays of case.

Fig. 3*B*.

Fig. 4.—Tooth view of case. The patient was instructed to keep tongue away from teeth.

Fig. 5.—Tooth view with tongue between teeth, which is her customary position.

The treatment was begun in April, 1937, and was continued until November, 1939, a total of thirty-one months of active treatment. The patient was seen at intervals of two weeks. The appliances were left in position as retainers

Fig. 6.—Tooth view with appliance in place.

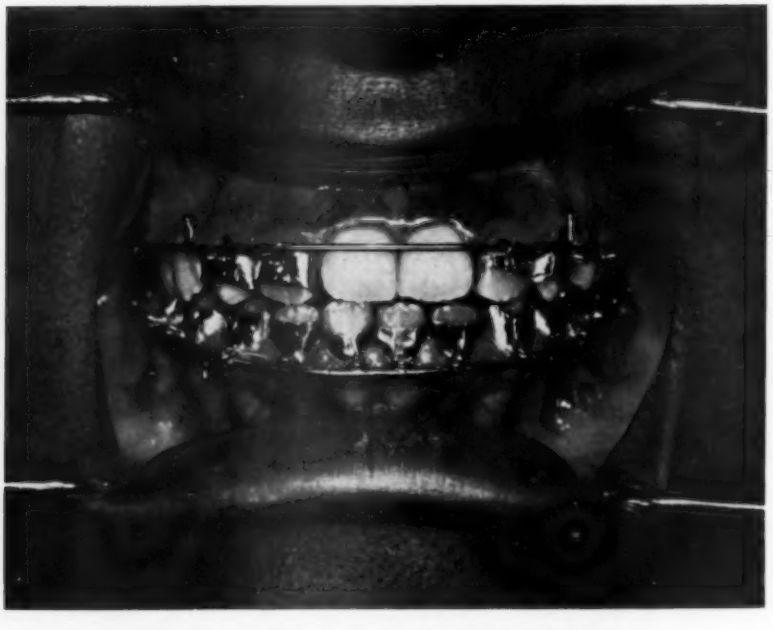


Fig. 7.—Tooth view showing slight relapse.

after the bite was closed, and the intermaxillary action was discontinued in November, 1939. It was decided to remove the bands, a few at a time, over an extended period.

In this way it is possible to determine whether or not the occlusion will maintain without further help.

Fig. 6 shows a tooth view with the appliances in place and the teeth in occlusal contact.

The premolar and central incisor bands were removed in March, 1940.

Subsequent to the removal of the incisor bands there was a slight tendency to relapse, as can be seen in Fig. 7. Intermaxillary elastics were again applied for a period of three months, and the occlusal relationship was immediately regained. Intermaxillary elastics were then discontinued, and it is now four months since they were worn. The patient was again warned about the importance of keeping the tongue in the proper position.

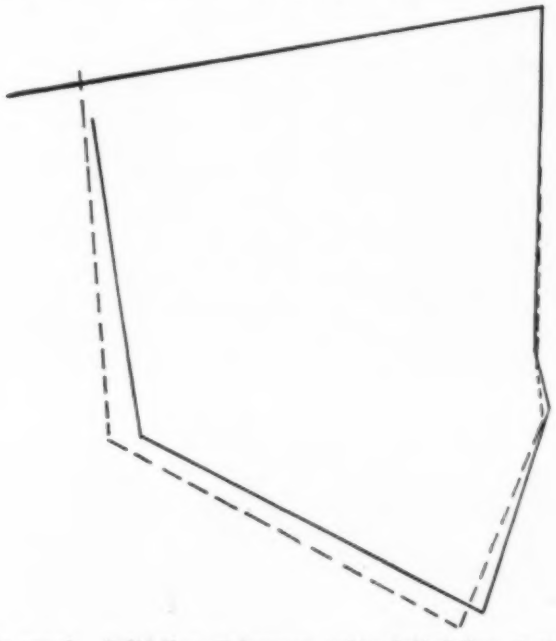


Fig. 8.—Cephalometric graph. Solid line, February, 1937; dotted line, September, 1940. Interval, three years and seven months.

While it is clinically evident that occlusal relationship has been established, it is desirable to determine the sites at which these changes took place (Fig. 8). A cephalometric study reveals the fact that the measurement from nasion to superior prosthion increased. This was naturally to be expected as the alveolar structure supporting the maxillary anterior teeth grew downward. Likewise, the measurement from infradentale to menton increased for the same reason. The total face height, which is the measurement from nasion to menton, has increased. Despite the fact that the pressure from the appliance exerted a force in an upward direction, we find that the mandible actually grew, increasing in size from gonion to menton as well as infradentale to menton and the adjustment associated with this growth carried the menton downward and backward. It is also of interest to note that the superior prosthion moved forward despite the fact that the arch wire was adjusted to prevent this forward movement. The measurement from the occlusal aspect of the buccal groove of the mandibular second molar to the inferior border of the mandible has also increased

despite the fact that reaction to the adjustment of the appliance might be expected to interfere with this growth.

It is apparent that orthodontic treatment is of great value in guiding the growth process. This growth process continues despite orthodontic treatment. The value of orthodontics is primarily the encouragement of growth at certain sites, while perhaps retarding other sites, and thus changing the proportions.

Observations.—Fig. 9 illustrates the x-rays of the maxillary and mandibular anterior teeth eleven months after treatment was begun. This illustrates the normal appearance of the bone around the anterior teeth, before we began to use intermaxillary action. They reveal no patent changes involving either the bone or cementum.

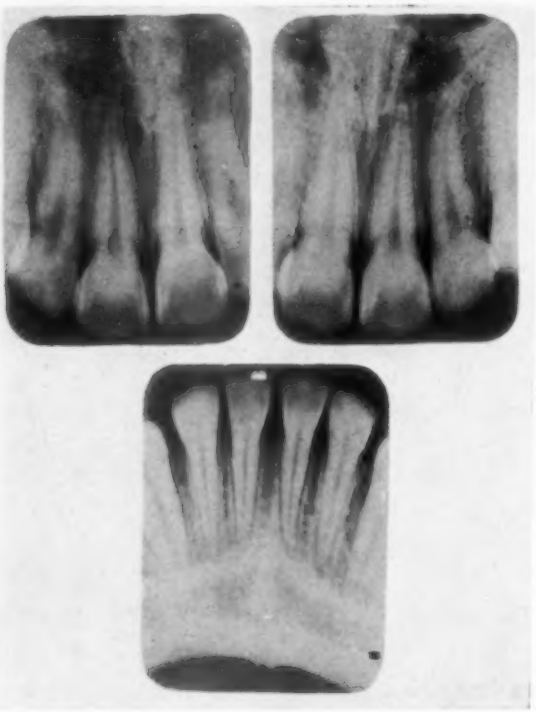


Fig. 9.—X-rays of anterior teeth March, 1938, before intermaxillary action was used.

Fig. 10 is an x-ray study of the anterior teeth in April, 1938, one month after instituting intermaxillary action, showing changes in the bone structure and cementum in the periapical region. There is an apparent destruction of bone and cementum coincident with the altered function. Radiographs were frequently taken, and when this condition was observed, active treatment was discontinued. The appliances were maintained passively as retainers so that functional stimulation would permit repair of the parts.

Fig. 11 shows that this repair has taken place after five months.

Fig. 12 is a still further study of the anterior teeth in July, 1939, after we resumed our intermaxillary action again, showing changes in the bone and cementum.

Fig. 10.—X-rays of anterior teeth April, 1938, one month after instituting intermaxillary action.

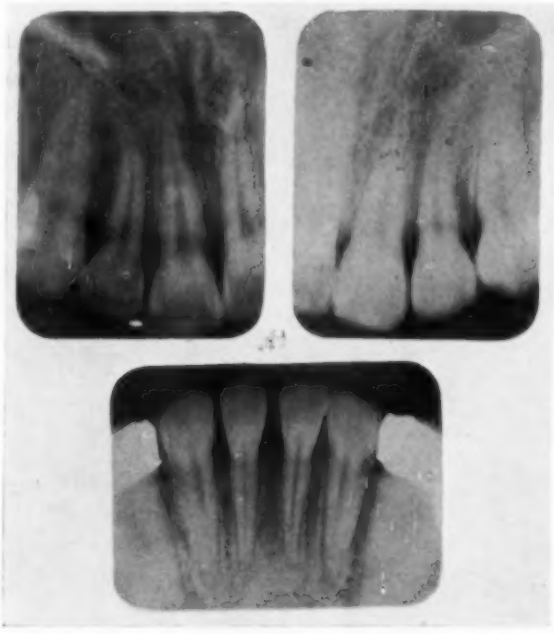


Fig. 11.—X-rays of anterior teeth September, 1938. The bone has returned to normal after rest period.

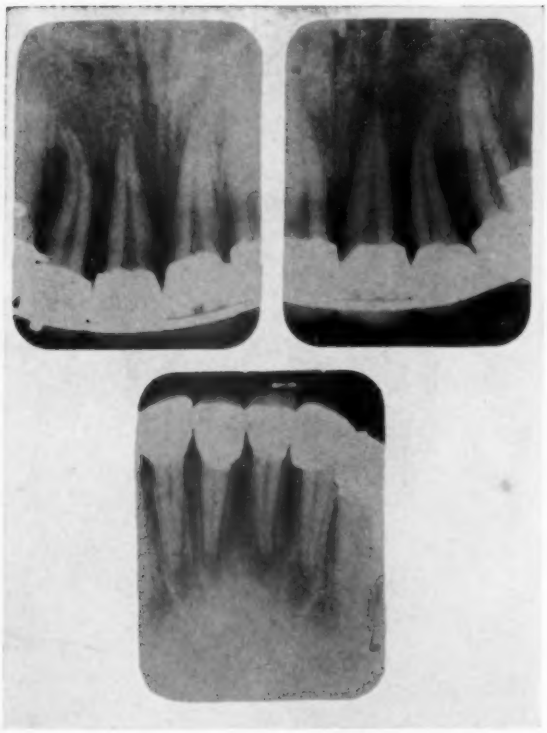


Fig. 12.—X-rays of anterior teeth July, 1939. Intermaxillary action was resumed with accompanying bone changes.

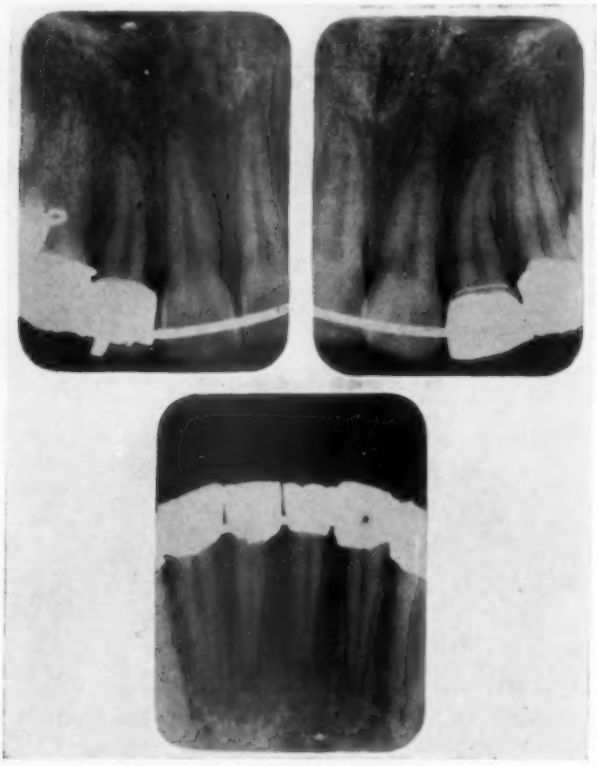


Fig. 13.—Anterior x-rays showing bone structure at present time, September, 1940.

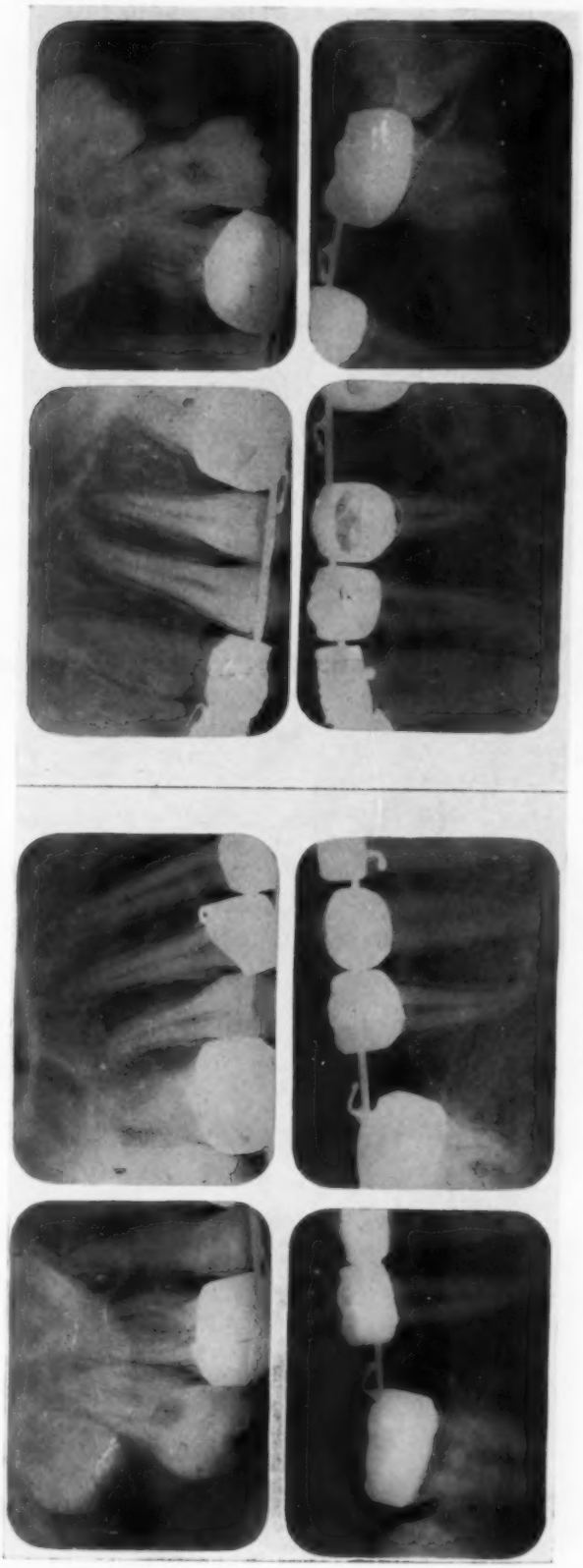


Fig. 14.—X-rays of posterior teeth, September, 1940.

Failure to allow proper intervals of rest tends to produce cumulative destruction. It is thus obvious that with proper care these extreme open-bite cases can be treated without producing root resorptions.

Figs. 13 and 14 illustrate the bone structure at the present time.

Fig. 15 shows the full face and profile views at present.

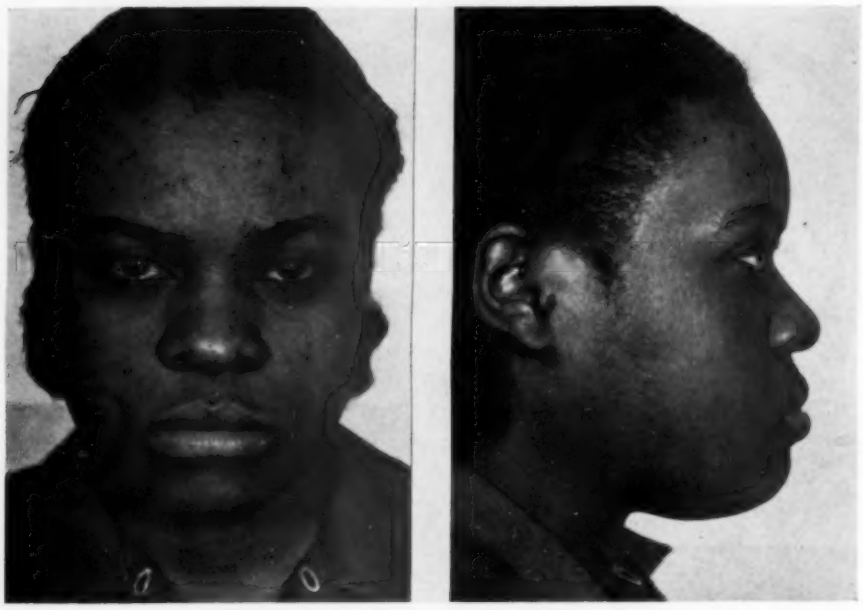


Fig. 15.—Full face and profile view at present.

This case is one of the routine cases which has been selected from the group of patients treated in the Orthodontia Department of New York University. As is customary, this case was treated by one of the postgraduate students under the direct supervision of the members of the staff.

I wish to thank Dr. Hemley for his valuable assistance in the preparation of this report.

ORTHODONTICS AS AN AID TO PROSTHODONTICS

CASE REPORT

CHARLES W. HLAVAC, D.D.S., NEW YORK, N. Y.

THE case to be presented is of interest because it shows how orthodontics may be instituted as an aid in preparing a mouth for prosthodontics.

The patient, 34 years old, applied for dental services at the New York University dental clinic with the object of having a number of teeth filled, and several missing teeth replaced. At no time did he realize that orthodontic treatment was either indicated or possible.

In the course of an examination by the Crown and Bridge Department of the New York University College of Dentistry, the difficulty of constructing suitable restorations was realized. Several points had to be considered: Figs. 1, 1A, and 2.

Fig. 1.—Full face and profile pictures at the beginning of the treatment.

1. The mandibular premolar teeth were crowded and in lingual relation to the maxillary premolars.

2. The mandibular left first molar was in supraclusion due to the removal of the maxillary left first permanent molar.

3. There was a marked overbite, the maxillary anterior teeth completely overlapping the mandibular anterior teeth.

The construction of a suitable restoration seemed impossible.

This case was called to the attention of Dr. Hemley, head of the Orthodontia Department, by Dr. Kabnick of the Crown and Bridge Department, and after the preliminary routine, both intraoral and extraoral radiographs, impressions for casts, and head measurements, it was decided that orthodontic treatment

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Read before the New York Society of Orthodontists, New York, N. Y., Nov. 11, 1940.

would be a great aid and would facilitate the construction of proper restorations. On superficial examination the case presents many of the characteristics of Class II Division 2. However, the case is actually a mutilated Class I. (See Fig. 2.)

In analyzing each individual jaw we note the following characteristics:

The maxillary arch presents:

1. Retrusion of anterior teeth.
2. Excessive overbite of anterior teeth.
3. The presence of a supernumerary molar on the right side.
4. The canines are crowded out of alignment.
5. A number of missing teeth: the maxillary right and left first permanent molars and the maxillary right first premolar.
6. Relatively normal width.

Fig. 1*A*.—Tooth view before treatment.

The mandibular arch presents:

1. A marked disturbance of the occlusal plane.
2. Narrow contracted arch.
3. The mandibular right first permanent molar is missing.
4. There is a linguoversion of the anterior teeth with a distal inclination of the canines and a lingual inclination of the premolars.
5. Supraversion of the mandibular left first permanent molar.
6. The premolars are lingual to the maxillary teeth.
7. The mandibular right lateral and central incisors and the left central incisor are devitalized (Fig. 3*A* and *B*).

Note: In spite of the pathologic condition surrounding these teeth they were retained because their presence facilitated the treatment. The further disposition of them will be left to the Crown and Bridge Department.

History.—The early medical history revealed that the patient weighed six pounds at birth and that the delivery was normal. He was breast fed for seventeen months.

The patient experienced the average children's diseases, was a mouth breather, had his tonsils and adenoids removed at the age of eight and had at one time a thumb-sucking habit. The history also disclosed the fact that the patient had the habit of sucking his tongue and that in childhood he used a teething bone. The following teeth had been extracted, maxillary right and left first permanent molars, maxillary right first premolar, and mandibular right first molar. The extractions took place over a wide range of time, beginning at about 12 years of age and terminating at 28 years, the last one being about six years ago. The patient had a vague recollection that his deciduous molars were long retained.

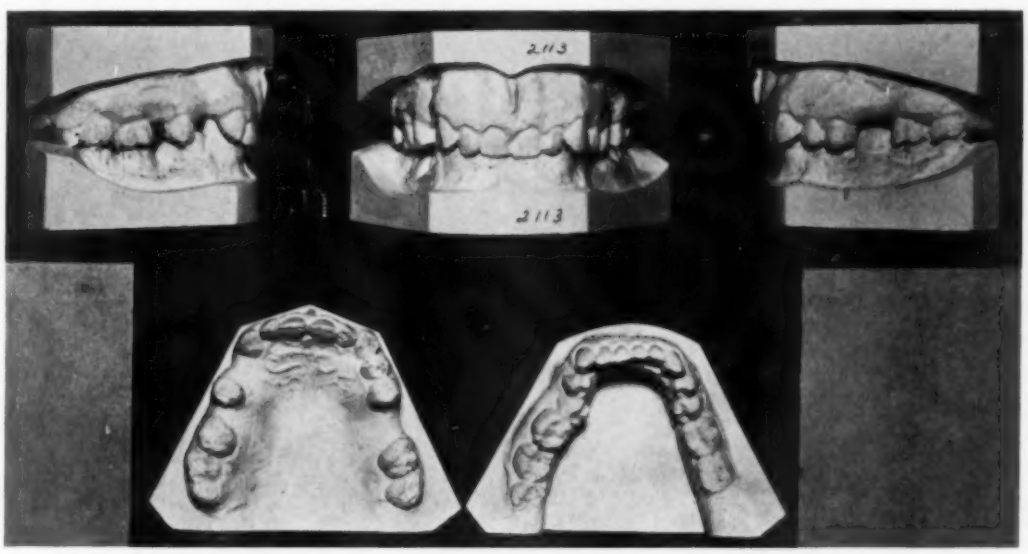


Fig. 2.—Casts of the case at inception of treatment.

Etiology.—From the medical history there is nothing to indicate that there are any systemic causes to account for the deformity present. We must, therefore, turn to the local causes for a clearer understanding of the etiology.

Because of the missing teeth, we must consider the various tooth drifts which have taken place. As a result of the loss of the mandibular right first molar, the second molar has inclined forward and the premolars have inclined distally to establish contact. Further, the mandibular anterior teeth have drifted lingually and, no doubt, are a factor in causing loss of dental height increasing the overbite. Due to this shifting toward the first molar space on the right side, the median line of the mandibular arch has also shifted to the right.

While the history is a little vague on this point, the fact that the mandibular left premolars are in linguoversion to the maxillary ones would seem to indicate that the deciduous molars were too long retained, causing the premolars to erupt in a lingual position.

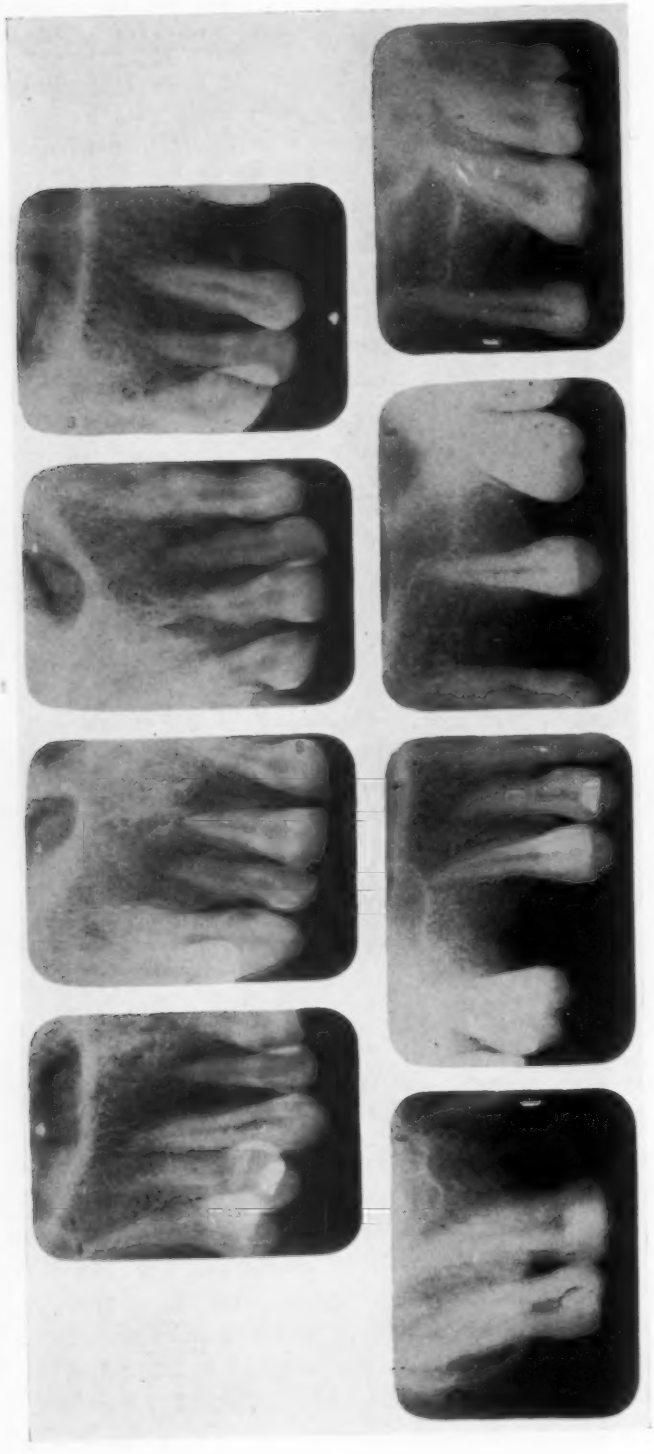


Fig. 34.—X-rays taken at beginning of case (maxillary teeth).

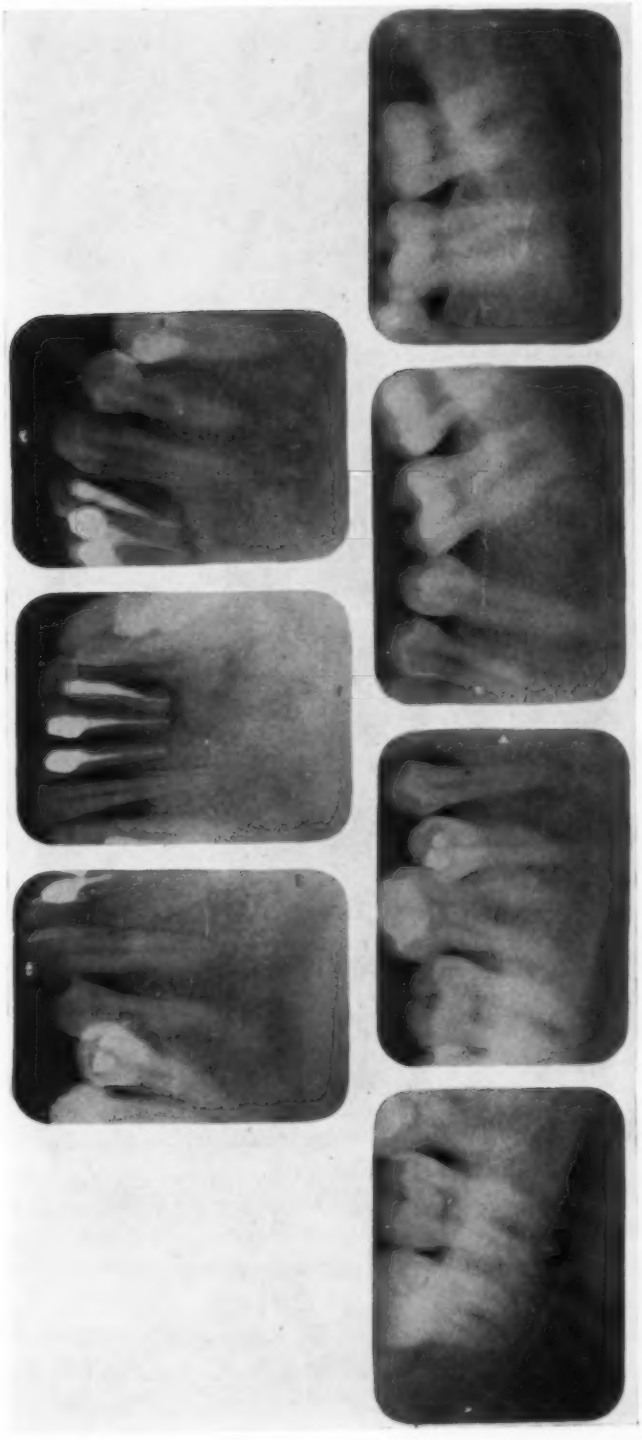


Fig. 3B.—X-rays taken at beginning of case (mandibular teeth).

The missing teeth in the maxilla have produced improper axial inclinations of the remaining teeth, causing them to occlude in improper inclined plane relationship.

There has been an upward growth of the bony structure supporting the mandibular anterior teeth, carrying them upward into contact with the soft tissues of the palate. This has increased the vertical overbite.

The mandibular first molar has grown upward into the space left by the extraction of the maxillary first molar.

Plan of Treatment.—The plan of treatment involved:

1. Insertion of a bite plate to overcome mechanical interference and facilitate the treatment in the mandibular arch.
2. Tipping the mandibular anterior teeth and canines labially.
3. Standing up the mandibular right second molar.
4. Tipping first and second premolars buccally.

This case in treatment had its limitations because of the number of missing teeth and the condition of the supporting structures. Therefore, our objective was to limit the orthodontic treatment to the extent of enabling the insertion of suitable restorations.

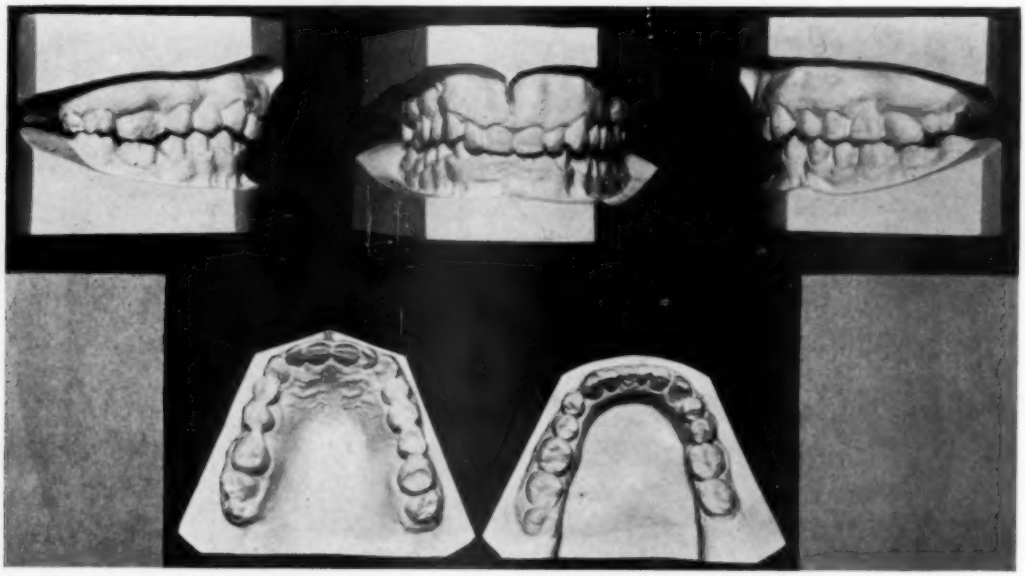


Fig. 4.—Shows casts with restorations in position.

The upper bite plate was so constructed that the patient occluded on the anterior teeth only and the posterior region remained open. By this means cusp interference was removed.

A simple labial arch which fitted into tubes soldered to the bands on the left first permanent molar and right second permanent molar was inserted on the mandibular arch. The canines also were banded. The arch was placed in such a position that, when the teeth were ligated to it, the canines had a tendency to be brought mesially and forward, and at the same time the molars were carried distally, thus freeing the locked-in premolars. No effort was made to recreate the space of the mandibular right first permanent molar.

The treatment was started in January, 1939, and completed in May, 1940. Active treatment extended over a period of seventeen months during which time the patient was seen every two weeks.

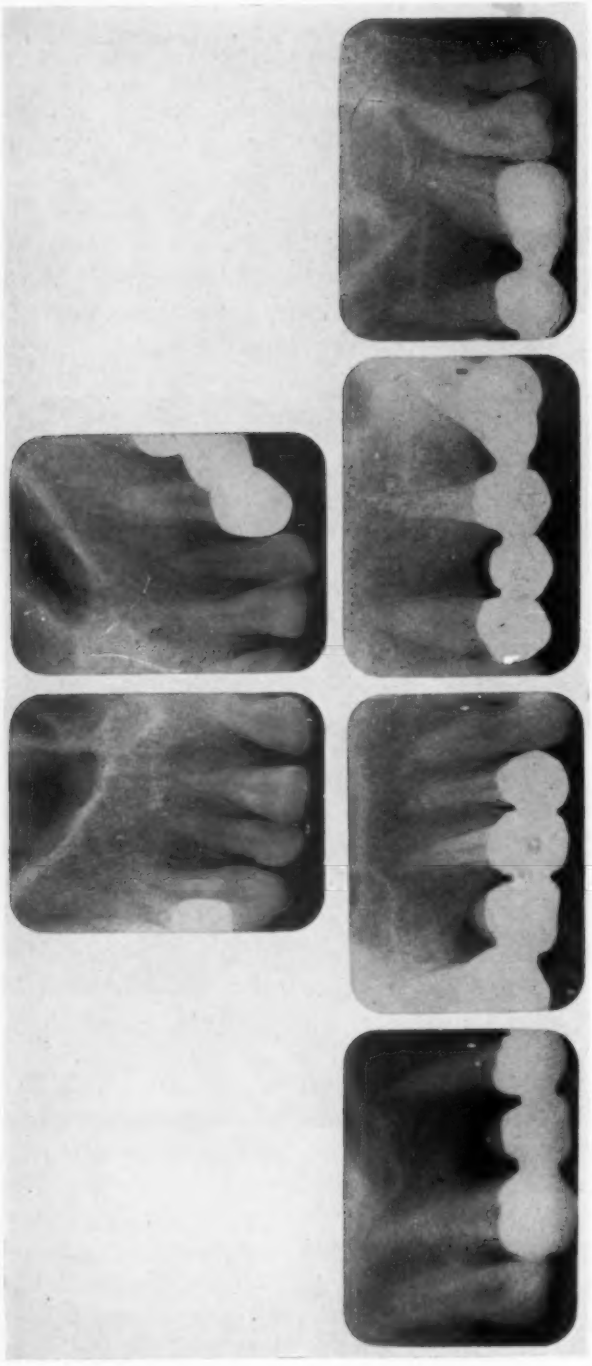
A vulcanite block was added to the bite plate in the region of the left first molar to prevent the further upward growth of the mandibular first permanent molar.

As soon as proper buccolingual relationship was established between the maxillary and mandibular premolars, the bite plate was discarded. At this stage there was a satisfactory functional relationship between the maxillary and mandibular teeth on the left side but the right canine and second premolar were not in a satisfactory functional relationship. They were somewhat in infraclusion and considerably buccal to the mandibular teeth. This was due to the occlusal relationship that existed before treatment was instituted. The bite plate prevented these teeth from moving lingually and occlusally.

Fig. 5.—Tooth view when case was completed.

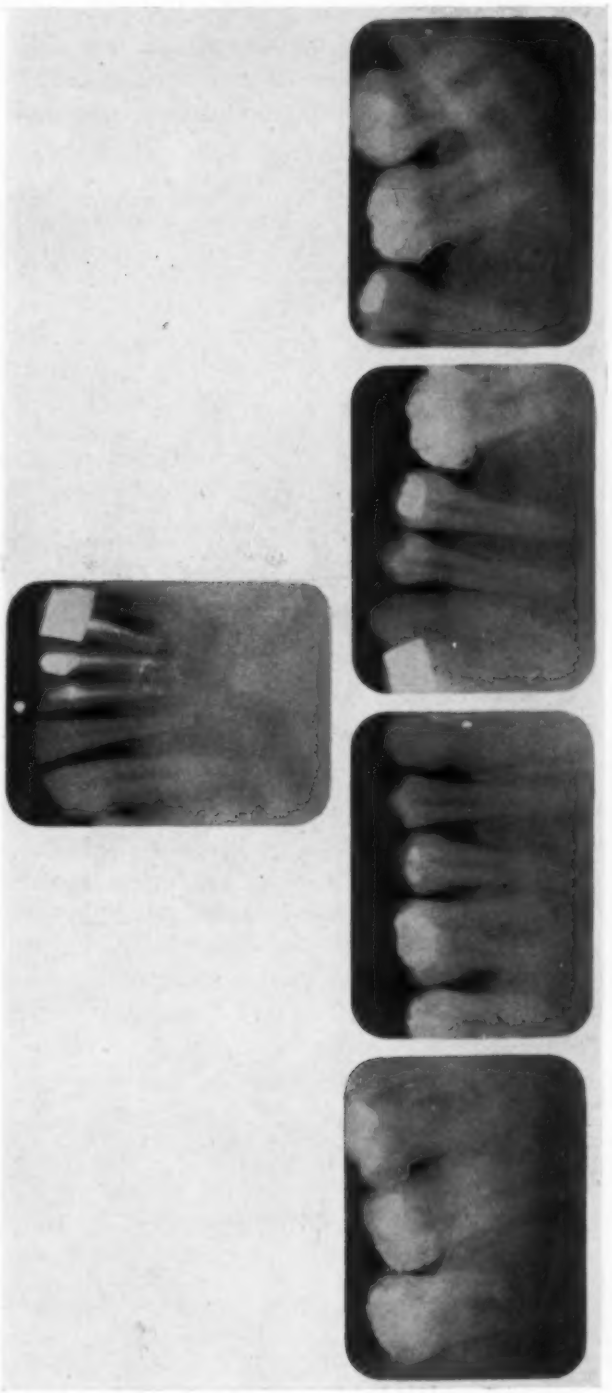
When the bite plate was removed, these teeth soon settled into a position satisfactory for their use as abutments. The operator for the Crown and Bridge Department inserted a bridge on the maxillary left side on June 25, 1940 and on the maxillary right side on Nov. 4, 1940. Fig. 4 shows the casts with the restorations in position. Fig. 5 shows the tooth view when the case was completed. Fig. 6 shows x-rays taken at the completion of treatment. The patient will again be referred to the Crown and Bridge Department where attention will be directed toward the appropriate disposition of the mandibular anterior teeth.

Growth Changes.—Before starting treatment it was impossible to measure dental height. Examination of models revealed that the dental height, that is, the measurement from prosthion to infradentale is zero or perhaps a minus quantity; at the completion of treatment we have a dental height of 3 mm.



A.

Figs. 6*A* and *B*.—X-rays at completion of treatment.



B.

The mandibular left first permanent molar has been depressed 1 mm. and the incisor teeth have depressed 1 mm. The mandibular right second permanent molar has not changed at all. This coincides with the theories presented by Kronfeld, Oppenheim, and Hemley. It would appear as set forth by these investigators, that the bone structure supporting teeth which have been deprived of occlusion for any considerable time undergoes changes which result in the resorption of many of the trabeculae, and this condition will permit of some depressions of these teeth.

Fig. 7.—Full face and profile at the end of treatment.

This case illustrates the manner in which the orthodontic department in an undergraduate school can bring to the attention of the student the intimate correlation between orthodontics and the general practice of dentistry.

While this case was treated by one of the postgraduate students, under supervision of the faculty, the undergraduate is given the privilege of observing these cases, and it is thus that his interest in orthodontics is stimulated.

Department of Orthodontic Abstracts and Reviews

Edited by

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All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City.

Serial Models of Two Cases of Normal Occlusion Between Birth and Four Years: By Lilah Clinch, L.D.S., R.C.S.I., London, England, *The Dental Record* **60:** No. 8, Aug., 1940.

A number of x-rays are shown illustrating fetal development from 56 days to 110 days. The jaw relationship during this period is not static. In early fetal life the lower jaw is projecting. With later development this relationship changes until finally there is a projection of the upper jaw. This thought has been illustrated schematically by A. H. Schultz.

Two cases showing serial development from birth to 4 years are presented. In Case 1 the lower gum pad is very slightly lingual to the upper, whereas in Case 2 the lower gum pad is much more so. Clinch considers the latter a delay in growth of the mandible. At 4 years, both have developed into normal occlusion.

In the discussion, Clinch says, "And every case which started with a post-normal mandible and had not a space in the incisor region, remained post-normal and ended up with a close-bite. If the antero-posterior relationship of the upper and lower jaws was normal, but there was no space, there was a close-bite all the way through. The lack of space was a bar to further development." The foregoing is not in accord with the findings of the writer.* We have shown serial casts where the mandibular gum pad was postnormal at birth with no space in the incisal region, and upon completion of the first dentition, normal occlusion was present.

J. H. Sillman, D.D.S.

Surgical Treatment of Hemiatrophy of the Face: By V. H. Kazanjian and Somers H. Sturgis, *J. A. M. A.* **115:** 348, 1940.

Progressive facial hemiatrophy is a self-limited condition that always leaves in its wake a grossly apparent facial deformity. It is not a rare syndrome; a bibliography of more than 400 articles reports 450 cases. No specific treatment is known that will always stop the progress of the disease. The authors describe their experience gained in six cases from surgical reconstruction with fat, fascia, and dermal grafts.

*Sillman, J. H.: A Serial Study on Occlusion from Birth to Three Years, AM. J. ORTHODONTICS 26: 207, 1940.

Hemiatrophy of the face may involve any or all of the superficial tissues, affecting skin, subcutaneous fat, and muscles, and at times, bone and cartilage as well. The disease process starts in one or more focal points on the head, and within a period of a few months to a few years may spread to involve the whole side of the face and scalp. Cases are reported in which the atrophy not only crossed over to the other side of the head but spread to the torso and limbs also. Involved skin frequently shows a brownish-yellow pigmentation; owing to loss of subcutaneous fat and wasting of underlying muscles, the skin is depressed and sometimes adherent to the deep fascia. A sharp borderline often demarcates pathologic from normal tissue. The cosmetic result of this condition is that of a unilateral wasting away of a part or the whole of one side of the face, with some areas of the skin showing an unsightly brownish pigmentation and others a whitish sclerodermic atrophy. Patches of alopecia on the scalp and lack of development of nasal and aural cartilage or of the bony framework accentuate the disfigurement.

It seems reasonable to conclude that hemiatrophy of the face most frequently results from infection or trauma causing injury to "some point, peripheral or central, of the sympathetic division of the 'vegetative' nervous system."

Treatment might properly be divided into three phases: (1) investigation of the underlying condition; (2) treatment of the local manifestations while the disease is in progress; and (3) treatment of the final deformity resulting from this condition.

On the basis of the authors' experience with six cases treated surgically, the following points appear to be worth emphasizing:

1. Selection of recipient area: A definite area is first decided on for reception of transplanted tissue.

2. Incisions: Various incisions were chosen in order to give convenient access to the areas selected for grafting and to leave scars least likely to be conspicuous. They selected (1) for the temporal region, incision with the hairline; (2) for the cheek, a vertical incision in front of the tragus, close to the anterior margin of the ear; (3) for asymmetrical jawline and chin, a curved incision behind the angle of the mandible; (4) for the corner of the mouth and lips, incisions at the mucocutaneous margins of the lips, and (5) for the orbital region, horizontal incisions parallel to the lid margins.

The most unfavorable of these incisions was found to be the fourth. Owing to the proximity and mobility of the mouth, it is difficult to keep the incisions dry, and the chance of sepsis is increased. Moreover, although scars along the vermilion border are inconspicuous, yet slight contractures near the corner of the mouth may alter considerably the pull of the oral muscles. In one case, that of a professional singer, the tightness of small scars near the angle of the mouth caused considerable discomfort.

Extreme gentleness should be used in handling and shaping the transplant. Uncalled-for crushing or trauma to the graft results in slough and necrosis. The nose and mouth cavities should be completely isolated from the surgical field. In one case an accidental puncture through the buccal mucosa led to infection and loss of the transplant.

All types of graft which include adipose tissue undergo considerable absorption, and therefore overcorrection of the depression with from one-half to two-thirds more tissue than apparently necessary is indicated.

Repeated operations must usually be performed in these cases. Although perfect symmetry of the face cannot be obtained, a satisfying degree of improvement may be acquired.

It is probably not without significance to note the change in outlook and mental attitude that often keeps pace with the patient's realization that a concrete and visible effort is being made to repair the defect.

Book Review

Proceedings, Dental Centenary Celebration. Baltimore, Md., March 18-20, 1940. Edited by George M. Anderson. Sponsors: Maryland State Dental Association and American Dental Association. Illustrated. Pp. 1061. Fabrikoid, price $5.00.

This publication of the proceedings constitutes a fitting climax to the now historic celebration held at Baltimore in March, 1940. It is a volume which every dentist will be proud to own. (We may say, parenthetically, that those who have not already purchased the Proceedings had better do so soon because of the limited supply.) The Proceedings wisely omits committee reports, which were published in a separate volume, and devotes itself largely to the publication of the scientific papers and historical events.

If one were to evaluate the Proceedings from the standpoint of the scientific papers published, the volume constitutes an encyclopedic review of modern dentistry, presented by most of the outstanding workers in the respective sub-specialties of which dentistry is composed.

Thus we find such men as Thompson, Ennis, and Main on radiography, whose articles on the detrimental biologic effects of roentgen rays will be found of especial interest. It may come as a surprise to read Ennis' warning that "x-rays are still fraught with danger," but this will not be surprising to the dentists who are today suffering from burns of the hands and fingers because of carelessness in handling x-ray apparatus.

Articles on full dentures by Schlosser and Flagstead will be found of practical interest, as will be the ones on silver amalgam by C. C. Cannon; dental cements by Paffenbarger; nonmetallic denture materials by Kimball; removable partial dentures by Schuyler; design of partial dentures by Wills; and a host of others.

In addition to the clinical papers, every phase of the basic sciences as they appertain to dentistry is discussed in the light of present-day progress. A happy medium has been struck in the inclusion of so-called basic scientific articles along with contributions which the dentist can apply in his everyday practice.

Section V is devoted to a detailed account of the historical drama *Wilderness* which was presented at Ford's Theatre in Baltimore during the week of the Centenary Celebration. The play opens on a scene in a blacksmith's shop located near Yorktown, at about the time of the Revolutionary War

battle. We are introduced to le Mayeur and his American pupils James Gardette and Josiah Flagg, who ministered to the members of Lafayette's army. Later the scene shifts to Hayden, his meeting with Harris, and their efforts in founding the Baltimore College of Dental Surgery in 1840. The scene again shifts, this time to Hartford, where Horace Wells, Riggs, and Colton unwittingly enacted the most dramatic episode in the annals of American dentistry. The history of dentistry contains its full share of poignant episodes, none of which were slighted here.

It must have required herculean labor on the part of Dr. Anderson and his committee to compile the material and to be able to publish it so soon after the Celebration took place. The format of the volume is dignified and ornate in appearance. The photographs are excellent, both those illustrating scientific articles and the ones of important historic events. There is a list of names of all persons who bought Centenary seals. A detailed historical review of dentistry is included, and there is an excellent index.

J. A. Salzmann.

Editorial

Dr. Kelsey Retires

It is of more than passing interest that one of the veteran orthodontists of America, Dr. Harry Kelsey of Baltimore, Md., has formally announced to his patients, friends, and confreres that after a long period of active practice he is now finding it increasingly difficult to meet the exacting requirements of practice and the maintenance of what to him, at least, seems a satisfactory standard of excellence in practice.

He announced his retirement from practice Dec. 1, 1940, also that he will be succeeded in his work by his most recent associate, Dr. Hammond Johnston. Upon inquiry by his friends, Dr. Kelsey makes it plain that while retiring from active practice he does not intend to "fold up his tent" like the traditional Arab and steal away from the professional atmosphere that he has enjoyed for so many years. It is plain he expects to be seen in the arena of orthodontic thought and discussion just as in the past. That spirit is wholesome, constructive, and an attitude that will be admired by hundreds of his friends in dentistry. They will applaud the man who retires and at the same time keeps up his active interest in his life's work. Kelsey's life as an orthodontist has, like many of the contemporary men of this half century, been not only a busy but also a full one, as the following list of a few of his activities will show:

> In 1896 Dr. Kelsey was graduated from the Baltimore College of Dental Surgery and immediately following spent some time in the office of Dr. E. A. Bogue in New York (one of the pioneers in orthodontics). Following that he began the general practice of dentistry in Baltimore. From 1908, following a course at the Angle School of Orthodontia held in New York City, he specialized in orthodontics to the date of retirement. He was a demonstrator in the Baltimore College of Dental Surgery 1896-1906, a lecturer on Orthodontics 1906-1910, a professor of Orthodontics, 1910 until the school merged with the University of Maryland in 1923.
>
> He is a member of the following organizations: Baltimore City Dental Society, Baltimore Association of Dental Surgeons, Maryland State Dental Association, American Dental Association, Member and past president of American Association of Orthodontists, New York Society of Orthodontists, Washington-Baltimore Society of Orthodontists, Southern Society of Orthodontists, Honorary Member Southwestern Society of Orthodontists, Honorary Member Virginia State Dental Association, President American Board of Orthodontics 1938 to the present, Member organization committee and Chairman of the International Relations of Dental Centenary Celebration, Baltimore,

1940, Member and past president of Dental Alumni Association of University of Maryland, Member of Dental Staff of Johns Hopkins Hospital in charge of Orthodontics from its inception in 1913 to date, former Chairman, Board of Trustees, Clarence J. Grieves Library Foundation, member Research Commission of the American Dental Association. He is a member of the University Club of Baltimore, Baltimore Country Club and of the Board of Trustees of the Henry Watson Children's Aid Society. He is a member of the Brown Memorial Presbyterian Church, also the American College of Dentists.

Dr. Kelsey has published fifty-seven manuscripts, and has given about fifty clinics. He has trained five younger men in orthodontics, Dr. George Anderson of Baltimore, Dr. Gerald A. Devlin of Newark, Dr. Kyrle W. Preis of Baltimore, Dr. Ralph W. Hodges of Hartford, and Dr. Hammond Johnston. He is now president of the American Board of Orthodontics, an organization that confers certificates of merit upon orthodontists subsequent to successful qualification.

During incumbency, as president of the Southern Society of Orthodontists, when the annual meeting in 1928 was held in Baltimore a testimonial dinner was tendered him by the Baltimore City Dental Society which was attended by the Southern Society members and other invited guests. At this dinner Dr. B. Lucien Brun was toastmaster and the following spoke:

Frederick B. Noyes, Chicago, Ill.
Oren A. Oliver, Nashville, Tenn.
John V. Mershon, Philadelphia, Pa.
Clinton C. Howard, Atlanta, Ga.
George E. Hardy, Baltimore, Md.
Walter E. Green, Baltimore, Md.

Dr. Walter E. Green, President of the Baltimore City Dental Society, presented a beautiful watch to Dr. Kelsey inscribed as follows:

— To —
Doctor Harry E. Kelsey
— By —
The Baltimore City Dental Society
in appreciation of his contributions
to Dentistry—1928

In congratulating Dr. Kelsey on the completion of a highly constructive and enviable professional career, the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY, no doubt, will be joined by hundreds of its readers who will wish him continued happiness. The respect of his confreres will accompany him in his well-earned retirement.

News and Notes

American Association of Orthodontists

The Thirty-Ninth Meeting of the American Association of Orthodontists will be held at the Waldorf Astoria Hotel in New York City, May 5 to 8, 1941.

Chicago Dental Society

The Seventy-Seventh Annual Midwinter Meeting of the Chicago Dental Society will be held at the Stevens Hotel, Feb. 17 to 20, 1941. All members of the Society and the A. D. A. are invited.

Five State Postgraduate Clinic

The Tenth Annual Five State Postgraduate Clinic of the District of Columbia Dental Society will convene at the Mayflower Hotel, Washington, D. C., March 9 to 13, 1941.

Central Association of Orthodontists

A luncheon meeting of the Central Association of Orthodontists will be held Tuesday, Feb. 18, at the Stevens Hotel during the Midwinter Clinic of the Chicago Dental Society. Notice of the room number will be furnished upon its assignment and will appear on the bulletin board of the hotel. No formal program will be presented. Reservations may be made through Dr. L. B. Higley, 705 South Summit St., Iowa City, Iowa, or through Dr. Harold J. Noyes, 55 East Washington St., Chicago, Ill.

Dallas Midwinter Dental Clinic

The Dallas Midwinter Dental Clinic, sponsored by the Dallas County Dental Society, will hold its fourteenth annual meeting at the Hotel Adolphus, Dallas, on April 21 to 23. This meeting will follow an all-day session of the House of Delegates of the Texas State Dental Society on April 20.

The study course will be presented by Dr. O. M. Dresden of Milwaukee, Wis., who will speak on "Prosthetic Dentistry"; Dr. Geo. W. Christiansen of Detroit, Mich., on "Oral Surgery"; Dr. W. Clyde Davis of Lincoln, Neb., on "Synthetic Porcelain"; and Dr. Fred Meyers of Minneapolis, Minn., on "Restorative Dentistry."

Cleveland Dental Society

The Spring Clinic Meeting of the Cleveland Dental Society will be held May 5 to 7, at the Statler Hotel, Cleveland.

Southwestern Society of Orthodontists

The Twentieth Annual Meeting of the Southwestern Society of Orthodontists will be held at the Hilton Hotel, Lubbock, Texas, Feb. 2 to 5.

OFFICERS OF ORTHODONTIC SOCIETIES*

American Association of Orthodontists

President, Henry U. Barber, Jr. - - - - 5 East Fifty-Seventh St., New York, N. Y.
Secretary-Treasurer, Max E. Ernst - - - 1250 Lowry Medical Arts Bldg., St. Paul, Minn.
Public Relations Bureau Director, Dwight Anderson
- - - - - - - - - - - - - - - - - 292 Madison Ave., New York, N. Y.

Central Association of Orthodontists

President, Harold J. Noyes - - - - - - - - - 55 E. Washington St., Chicago, Ill.
Secretary-Treasurer, L. B. Higley - - - - - - - - 705 Summit Ave., Iowa City, Iowa

Great Lakes Society of Orthodontists

President, Frank S. Cartwright - - - - - - - - Henry Ford Hospital, Detroit, Mich.
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Secretary-Treasurer, Edward I. Silver - - - - - - - - 80 Boylston St., Boston, Mass.

New York Society of Orthodontists

President, Glenn F. Young - - - - - - - - - - - 745 Fifth Ave., New York, N. Y.
Secretary-Treasurer, William C. Keller - - - - 40 E. Forty-Ninth St., New York, N. Y.

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President, Will G. Sheffer - - - - - - - - - - Medico Dental Bldg., San Jose, Calif.
Secretary-Treasurer, Earl F. Lussier - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, A. B. Brusse - - - - - - - - - - - - 1558 Humboldt St., Denver, Colo.
Secretary-Treasurer, Robert L. Gray - - - - - - - - - Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, Fred G. Hale - - - - - - - - - - - Professional Bldg., Raleigh, N. C.
Secretary-Treasurer, T. C. Sparks - - - - - - - 1508 Washington St., Columbia, S. C.

Southwestern Society of Orthodontists

President, G. C. Turner - - - - - - - - - - - - 406 Myrick Bldg., Lubbock, Texas
Secretary-Treasurer, R. E. Olson - - - - - - - Union Nat'l Bank Bldg., Wichita, Kan.

Washington-Baltimore Society of Orthodontists

President, George M. Anderson - - - - - - - - - - 831 Park Ave., Baltimore, Md.
Secretary-Treasurer, Stephen C. Hopkins - - - - - 1726 Eye St., Washington, D. C.

American Board of Orthodontics

President, Harry E. Kelsey - - - - - - - - - - - 833 Park Ave., Baltimore, Md.
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Secretary, Charles R. Baker - - - - - - - - - - - 636 Church St., Evanston, Ill.
Treasurer, Bernard G. DeVries - - - - - - - Medical Arts Bldg., Minneapolis, Minn.
William E. Flesher - - - - 806 Medical Arts Bldg., Oklahoma City, Okla.
Frederic T. Murlless, Jr. - - - - - - 43 Farmington Ave., Hartford, Conn.
Oliver W. White - - - - - - - - 213 David Whitney Bldg., Detroit, Mich.
James D. McCoy - - - - - - - - 3839 Wilshire Blvd., Los Angeles, Calif.

Foreign Societies†

British Society for the Study of Orthodontics

President, S. A. Riddett
Secretary, R. Cutler
Treasurer, Harold Chapman

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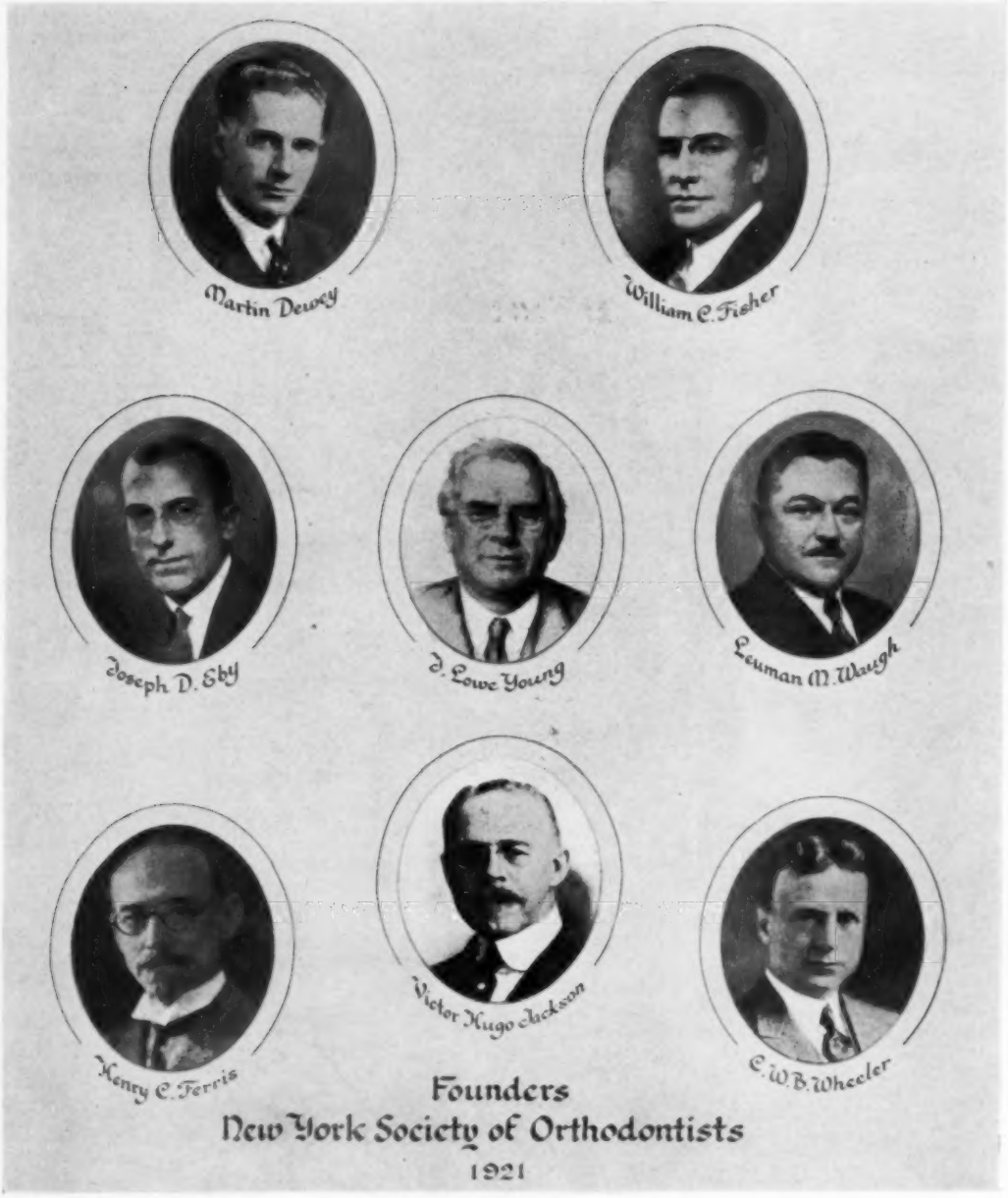
*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

†The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis, Mo., U. S. A.



Founders
New York Society of Orthodontists
1921